# National Heart, Lung, and Blood Institute

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## Fiscal Year 1990

U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
Public Health Service
National Institutes of Health

# National Heart, Lung, and Blood Institute

# Fact Book Fiscal Year 1990

U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
Public Health Service
National Institutes of Health

February 1991

For Administrative Use

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# 1. Directory of Personnel*

| **Office of the Director** | **Bldg.** | **Room** | **Phone** |
|---|---|---|---|
| Director, **Claude Lenfant, M.D.** | 31 | 5A52 | 496-5166 |
| Deputy Director, **Peter L. Frommer, M.D.** | 31 | 5A49 | 496-1078 |
| Associate Director for Administrative Management (Executive Officer), **Stephen A. Ficca** | 31 | 5A50 | 496-2411 |
| Associate Director for Scientific Program Operation, **Barbara Packard, M.D., Ph.D.** | 31 | 5A03 | 496-6331 |
| Acting Associate Directors for Prevention, Education, and Control, **Theresa C. Bellicha and Gregory J. Morosco, Ph.D., M.P.H.** | 31 | 4A03 | 496-5437 |
| Associate Director for International Programs, **Ruth J. Hegyeli, M.D.** | 31 | 4A07 | 496-5375 |
| Special Assistant to the Director (NHLBI AIDS Coordinator), **Elaine Sloand, M.D.** | 31 | 5A21 | 496-3245 |
| Assistant to the Director, **Sheila Pohl** | 31 | 5A52 | 496-6471 |
| Technology Development Coordinator, **Stephen A. Ficca** | 31 | 5A50 | 496-2411 |
| Assistant Technology Development Coordinator, **Lillian Portilla** | 31 | 5A08 | 496-9737 |
| Office of International Programs, Director, **Ruth J. Hegyeli, M.D.** | 31 | 4A07 | 496-5375 |
| Office of Administrative Management, Director, **Stephen A. Ficca** | 31 | 5A50 | 496-2411 |
| Deputy Executive Officer, **Jack S. Nance** | 31 | 5A50 | 496-2411 |
| Chief, Administrative Services Branch, **Gretchen S. Jones** | 31 | 5A31 | 496-5931 |
| Chief, Financial Management Branch, **James R. Wehling** | 31 | 5A46 | 496-4653 |
| Chief, Management Policy and Technology Branch, **Sheila Merritt** | 31 | 5A08 | 496-9737 |
| Chief, Personnel Management Branch, **Peggy O'Brien** | 31 | 5A32 | 496-6477 |
| Office of Special Concerns, Director, **Mary F. Spears** | 31 | 4A28 | 496-1763 |
| Freedom of Information Coordinator, **Mishyelle Croom** | 31 | 5A08 | 496-9737 |
| Privacy Act Coordinator, **Mishyelle Croom** | 31 | 5A08 | 496-9737 |
| Office of Prevention, Education, and Control, Acting Directors, **Theresa C. Bellicha and Gregory J. Morosco, Ph.D., M.P.H.** | 31 | 4A03 | 496-5437 |
| Chief, Communications and Public Information Branch, **Theresa C. Bellicha** | 31 | 4A21 | 496-4236 |
| Chief, Health Education Branch, **Gregory J. Morosco, Ph.D., M.P.H.** | 31 | 4A18 | 496-1051 |
| Coordinator, National High Blood Pressure Education Program, **Edward J. Roccella, Ph.D., M.P.H.** | 31 | 4A05 | 496-0554 |
| Coordinator, National Cholesterol Education Program, **James I. Cleeman, M.D.** | 31 | 4A05 | 496-0554 |
| Coordinator, NHLBI Smoking Education Program, **Glen Bennett, M.P.H.** | 31 | 4A18 | 496-1051 |
| Coordinator, National Blood Resource Education Program, **Susan D. Rogus, R.N., M.S.N.** | 31 | 4A05 | 496-0554 |
| Coordinator, National Asthma Education Program, **Robinson Fulwood, M.S.P.H.** | 31 | 4A18 | 496-1051 |

---

* Current as of November 15, 1990. For locating personnel not listed, the general information number is 301-496-4000. For direct dialing, the area code is 301.

FE—Federal Building, 7550 Wisconsin Avenue, Bethesda, Maryland 20892.
WW—Westwood Building, 5333 Westbard Avenue, Bethesda, Maryland 20892.

## Office of the Director (continued)

| | Bldg. | Room | Phone |
|---|---|---|---|
| Office of Program Planning and Evaluation, Director, **Barbara Packard, M.D., Ph.D.** | 31 | 5A03 | 496-6331 |
| Deputy Director, **Carl A. Roth, Ph.D., J.D.** | 31 | 5A11 | 496-3620 |
| Chief, Information Systems Branch, **Ralph Van Wey** | WW | 632 | 496-7875 |
| Chief, Office Automation Systems Branch, **Leonard Mihalko** | 31 | 5A17 | 496-8992 |
| Chief, Planning and Coordination Branch, **Dennis S. Askwith** | 31 | 5A03 | 496-5031 |
| Chief, Program Analysis and Evaluation Branch, **Carl A. Roth, Ph.D., J.D.** | 31 | 5A11 | 496-3620 |

## Division of Heart and Vascular Diseases

| | Bldg. | Room | Phone |
|---|---|---|---|
| Director, **Eugene R. Passamani, M.D.** | FE | 416A | 496-2553 |
| Associate Director for Scientific Programs, **David M. Robinson, Ph.D.** | FE | 416B | 496-2553 |
| Administrative Officer, **Leslie Friel** | FE | 408B | 496-5594 |
| Chief, Research Training and Development Branch, **John L. Fakunding, Ph.D.** | FE | 3A08A | 496-1724 |
| Associate Director for Cardiology, **Michael T. Horan, M.D.** | FE | 320 | 496-5421 |
| Deputy Associate Director for Cardiology, **Frank D. Altieri, Ph.D.** | FE | 320 | 496-5421 |
| Chief, Cardiac Diseases Branch, **Constance E. Weinstein, Ph.D.** | FE | 3C06 | 496-1081 |
| Chief, Cardiac Functions Branch, **Peter Spooner, Ph.D.** | FE | 304A | 496-1627 |
| Chief, Devices and Technology Branch, **John T. Watson, Ph.D.** | FE | 312A | 496-1586 |
| Associate Director for Arteriosclerosis, Hypertension, and Lipid Metabolism, **Gardner C. McMillan, M.D., Ph.D.** | FE | 4C12A | 496-1613 |
| Chief, Hypertension and Kidney Diseases Branch, **Stephen C. Mockrin, Ph.D.** | FE | 4C12B | 496-1857 |
| Chief, Lipid Metabolism-Atherogenesis Branch, **Basil M. Rifkind, M.D.** | FE | 4A14A | 496-1681 |

## Division of Lung Diseases

| | Bldg. | Room | Phone |
|---|---|---|---|
| Director, **Suzanne S. Hurd, Ph.D.** | WW | 6A16 | 496-7208 |
| Associate Director for Scientific Program Operations, **Carol E. Vreim, Ph.D.** | WW | 6A16 | 496-7208 |
| Special Assistant to the Director, **J. Sri Ram, Ph.D.** | WW | 6A11 | 496-0895 |
| Administrative Officer, **Loretta A. Layton** | WW | 6A12 | 496-7984 |
| Chief, Airways Diseases Branch, **James P. Kiley, Ph.D.** | WW | 6A15 | 496-7332 |
| Chief, Interstitial Lung Diseases Branch, **Anthony R. Kalica, Ph.D.** | WW | 6A09 | 496-7034 |
| Chief, Prevention, Education, and Research Training Branch, **Sydney R. Parker, Ph.D.** | WW | 640C | 496-7668 |
| Chief, Structure and Function Branch, **Dorothy B. Gail, Ph.D.** | WW | 6A07 | 496-7171 |

---

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For direct dialing, the area code is 301.

FE—Federal Building, 7550 Wisconsin Avenue, Bethesda, Maryland 20892.
WW—Westwood Building, 5333 Westbard Avenue, Bethesda, Maryland 20892.

## Division of Blood Diseases and Resources

| | Bldg. | Room | Phone |
|---|---|---|---|
| Director, **John C. Hoak, M.D.** | FE | 518A | 496-4868 |
| Associate Director for Scientific Programs, **Carol H. Letendre, Ph.D.** | FE | 516A | 496-8966 |
| Assistant to the Director for Research Training, **Fann Harding, Ph.D.** | FE | 5A08B | 496-1817 |
| Special Assistant for Clinical Hematology, **Paul R. McCurdy, M.D.** | FE | 514A | 496-8387 |
| Administrative Officer, **Judith B. Ireland** | FE | 512A | 496-3533 |
| Chief, Blood Diseases Branch, **Alan S. Levine, Ph.D.** | FE | 5A12A | 496-5911 |
| Chief, Blood Resources Branch, **George J. Nemo, Ph.D.** | FE | 5C10A | 496-1537 |
| Chief, Program Planning and Prevention Branch, **Allan W. Czarra** | FE | 5C02 | 496-4186 |
| Chief, Sickle Cell Disease Branch, **Clarice D. Reid, M.D.** | FE | 504D | 496-6931 |

## Division of Epidemiology and Clinical Applications

| | | | |
|---|---|---|---|
| Director, **William R. Harlan, M.D.** | FE | 212 | 496-2533 |
| Associate Director for Scientific Programs, **Gerald Payne, M.D.** | FE | 220 | 496-2533 |
| Administrative Officer, **Patricia D. Robertson** | FE | 204 | 496-8837 |
| Chief, Biostatistics Research Branch, **Nancy L. Geller, Ph.D.** | FE | 2A11 | 496-5905 |
| Associate Director for Clinical Applications and Prevention, **Lawrence Friedman, M.D.** | FE | 5C06 | 496-1706 |
| Chief, Clinical Trials Branch, **Lawrence Friedman, M.D.** | FE | 5C06 | 496-1706 |
| Chief, Prevention and Demonstration Research Branch, **Jeffrey Cutler, M.D.** | FE | 604C | 496-2465 |
| Chief, Behavioral Medicine Branch, **Stephen Weiss, Ph.D.** | FE | 216 | 496-9380 |
| Associate Director for Epidemiology and Biometry, **Millicent Higgins, M.D.** | FE | 2C08 | 496-2327 |
| Chief, Clinical and Genetic Epidemiology Branch, **Peter Savage, M.D.** | FE | 300B | 496-4333 |
| Chief, Field Studies and Biometry Branch, **Robert Garrison** | FE | 3A12 | 496-5826 |
| Chief, Social and Environmental Epidemiology Branch, **A. Richey Sharrett, M.D.** | FE | 2C08 | 496-8887 |

## Division of Extramural Affairs

| | | | |
|---|---|---|---|
| Director, **Ronald G. Geller, Ph.D.** | WW | 7A17B | 496-7416 |
| Deputy Director, **Henry G. Roscoe, Ph.D.** | WW | 7A17A | 496-7225 |
| Associate Director for Review, **Jim L. Shields, Ph.D.** | WW | 557 | 496-7919 |
| Chief, Office of Program Policy and Procedure, **Henry G. Roscoe, Ph.D.** | WW | 7A17A | 496-7225 |
| Administrative Officer, **Christinia E. Roark** | WW | 7A11B | 496-7893 |
| Chief, Contracts Operations Branch, **Robert R. Carlsen** | WW | 650A | 496-7666 |
| Chief, Grants Operations Branch, **Lois J. Hinde** | WW | 4A18A | 496-7255 |
| Chief, Review Branch, **Jim L. Shields, Ph.D.** | WW | 557 | 496-7919 |

---

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WW—Westwood Building, 5333 Westbard Avenue, Bethesda, Maryland 20892.

| Division of Intramural Research | Bldg. | Room | Phone |
|---|---|---|---|
| Director, **Edward D. Korn, Ph.D.** | 10 | 7N214 | 496-2116 |
| Clinical Director, **Harry R. Keiser, M.D.** | 10 | 8C103 | 496-1518 |
| Deputy Clinical Director, **Arthur R. Nienhuis, M.D.** | 10 | 7C103 | 496-5093 |
| Administrative Officer, **Hillel Soclof** | 10 | 7N218 | 496-3483 |
| Deputy Administrative Officer, **Lila Edwards** | 10 | 7N216 | 496-3483 |
| Chief, Section on Laboratory Animal Medicine and Surgery, **Robert F. Hoyt, Jr., D.V.M., M.S.** | 14E | 106B | 496-9673 |
| Chief, Cardiology Branch, **Stephen E. Epstein, M.D.** | 10 | 7B15 | 496-5817 |
| Chief, Clinical Hematology Branch, **Arthur R. Nienhuis, M.D.** | 10 | 7C103 | 496-5093 |
| Chief, Hypertension-Endocrine Branch, **Harry R. Keiser, M.D.** | 10 | 8C103 | 496-1518 |
| Chief, Molecular Disease Branch, **H. Bryan Brewer, Jr., M.D.** | 10 | 7N117 | 496-5095 |
| Chief, Molecular Hematology Branch, **W. French Anderson, M.D.** | 10 | 7D18 | 496-5844 |
| Chief, Pathology Branch, **William C. Roberts, M.D.** | 10 | 2N258 | 496-5203 |
| Chief, Pulmonary Branch, **Ronald G. Crystal, M.D.** | 10 | 6D03 | 496-1597 |
| Chief, Laboratory of Biochemical Genetics, **Marshall W. Nirenberg, Ph.D.** | 36 | 1C06 | 496-2401 |
| Chief, Laboratory of Biochemistry, **Earl R. Stadtman, Ph.D.** | 3 | 222 | 496-4096 |
| Chief, Laboratory of Biophysical Chemistry, **Henry M. Fales, Ph.D.** | 10 | 7N309 | 496-2135 |
| Chief, Laboratory of Cardiac Energetics, **Robert Balaban, Ph.D.** | 1 | B307 | 496-3658 |
| Chief, Laboratory of Cell Biology, **Edward D. Korn, Ph.D.** | 3 | B122 | 496-1616 |
| Chief, Laboratory of Cellular Metabolism, **Martha Vaughan, M.D.** | 10 | 5N307 | 496-4554 |
| Chief, Laboratory of Chemical Pharmacology, **James R. Gillette, Ph.D.** | 10 | 8N117 | 496-2593 |
| Chief, Laboratory of Kidney and Electrolyte Metabolism, **Maurice B. Burg, M.D.** | 10 | 6N307 | 496-3187 |
| Chief, Laboratory of Molecular Cardiology, **Robert S. Adelstein, M.D.** | 10 | 8N202 | 496-1865 |

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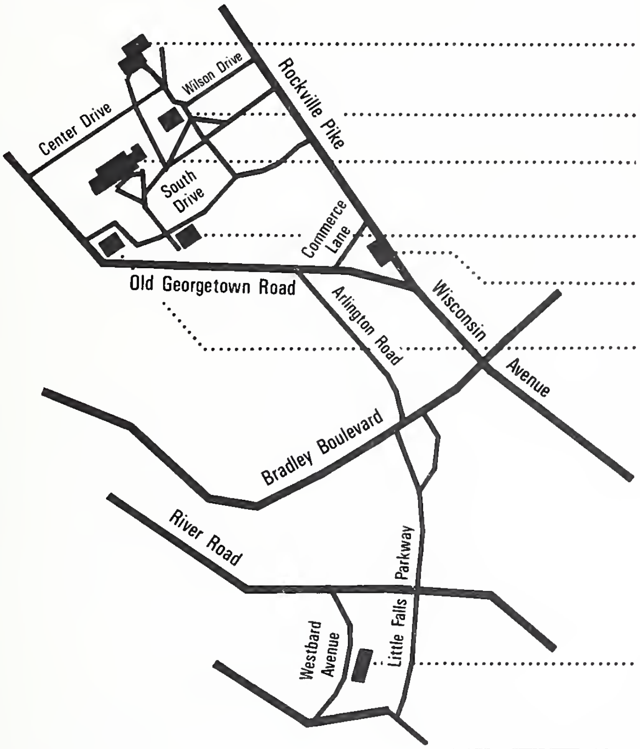
For locating personnel not listed, the general information number is 301-496-4000.
For direct dialing, the area code is 301.

FE—Federal Building, 7550 Wisconsin Avenue, Bethesda, Maryland 20892.
WW—Westwood Building, 5333 Westbard Avenue, Bethesda, Maryland 20892.

## Location of Buildings Occupied by NHLBI Personnel*



Building 31, NIH Campus, 9000 Rockville Pike,
Bethesda, Maryland 20892

Building 3, NIH Campus, 9000 Rockville Pike,
Bethesda, Maryland 20892

Building 10, NIH Campus, 9000 Rockville Pike,
Bethesda, Maryland 20892

Building 14E, NIH Campus, 9000 Rockville Pike,
Bethesda, Maryland 20892

Federal Building, 7550 Wisconsin Avenue,
Bethesda, Maryland 20892

Building 36, NIH Campus, 9000 Rockville Pike,
Bethesda, Maryland 20892

Westwood Building, 5333 Westbard Avenue,
Bethesda, Maryland 20892

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*Not to scale.

# 2. Program Overview

Eighteen years ago, in Section 413 of the National Heart, Blood Vessel, Lung, and Blood Act (P.L. 92-423), the Congress required the Institute to expand and coordinate its activities in an accelerated attack against heart, blood vessel, lung, and blood diseases. Called the National Heart, Blood Vessel, Lung, and Blood Disease Program (later expanded to include blood resources), the effort was to include research on the epidemiology, etiology, and prevention of diseases in the NHLBI purview; basic biologic research on cardiovascular, pulmonary, and hematologic mechanisms and processes; development and evaluation of devices to assist, replace, or monitor vital organs; field studies and large-scale tests; the collection, preservation, and distribution of blood and blood products; education and training of scientists and clinicians; and public and professional education in all aspects of heart, blood vessel, lung, and blood diseases and blood resources.

Twenty-eight task groups of approximately 250 medical and scientific advisors assessed the understanding of these problems and identified new opportunities for initiatives. The National Program, which was published in 1973, established 20 of the 21 discrete areas of research shown in the table below (acquired immunodeficiency syndrome was added in 1988) and planned goals and objectives for the next 5 years. Each year since that time, the Institute has assessed the progress of the National Program and updated its goals and objectives.

The National Program is expanded and revised as new opportunities are identified, and it provides the framework for guiding the Institute's research. The approach used by the NHLBI is an orderly sequence of research activities that include:

- acquisition of knowledge,
- evaluation of knowledge, and
- application of knowledge.

The program is carried out through four extramural units: the Division of Heart and Vascular Diseases, the Division of Lung Diseases, the Division of Blood Diseases and Resources, and the Division of Epidemiology and Clinical Applications, and one intramural unit, the Division of Intramural Research. Each Division pursues its own scientific mission, and

**National Heart, Blood Vessel, Lung, and Blood Diseases and Blood Resources Program**

**Heart and Vascular Diseases**

Arteriosclerosis
Hypertension
Cerebrovascular disease
Coronary heart disease
Peripheral vascular diseases
Arrhythmias
Heart failure and shock
Congenital and rheumatic heart diseases
Cardiomyopathies and infections of the heart
Circulatory assistance
Acquired immunodeficiency syndrome

**Lung Diseases**

Structure and function of the respiratory system
Chronic obstructive pulmonary disease
Pediatric pulmonary diseases
Occupational and immunologic lung diseases
Respiratory failure
Pulmonary vascular diseases
Acquired immunodeficiency syndrome

**Blood Diseases and Resources**

Bleeding and clotting disorders
Disorders of the red blood cell
Sickle cell disease
Blood resources
Acquired immunodeficiency syndrome

the Divisions cooperate in areas of shared interest, such as prevention, education, and control. The extramural Divisions use a variety of funding mechanisms, including research grants, program project grants, contracts, centers, and research training programs. Descriptions of the divisional programs follow.

### Division of Heart and Vascular Diseases

An estimated 62 million people, or 25 percent of the U.S. population, have hypertension; 20 million have heart disease, 6 million of whom have coronary heart disease; 3 million have cerebrovascular disease; and 2 million have peripheral vascular diseases. Although the total number of people with cardiovascular diseases is not known, it is at least 62 million, 40 million of whom are under 65 years of age. At least 20 percent of all people with these diseases are limited in activity. About 44 percent of all deaths in 1989 (945,000) were attributed to cardiovascular diseases, and the economic cost to the Nation in 1988 was an estimated $144 billion, of which $73 billion was for health expenditures and $71 billion for lost productivity.

The Division of Heart and Vascular Diseases (DHVD) plans and directs an integrated and coordinated research program with emphasis on advancing knowledge of the causes, diagnosis, treatment, and prevention of heart and vascular diseases. The strategy for implementation of National Program goals provides a balance of activities across the continuum of biomedical research, with an emphasis on fundamental mechanisms. Multidisciplinary programs are supported to advance basic knowledge of disease and to generate the most effective methods of clinical management and prevention. Clinical trials, which are an important part of the research program, provide an opportunity to test and apply promising preventive or therapeutic measures.

Major emphasis within the Division's research program in FY 1990 was in the areas of arteriosclerosis, coronary heart disease, and hypertension. Examples of newly supported programs include research on the molecular genetics of hypertension in humans and animals; models for treating high blood cholesterol; a pilot study of HMG CoA reductase inhibitors in the elderly; models for hypertension research using transgenic animals; basic developmental biology of the vessel wall; and molecular and cellular embryology of heart muscle. The Division issued solicitations for investigator-initiated research on cost-effective strategies of cholesterol lowering; cardiovascular device-centered infections; mechanisms of damage caused by cardiopulmonary bypass; mechanisms of hypertension in Black men and women; and mechanisms of restenosis after coronary angioplasty. The Division also solicited applications for Specialized Centers of Research in Arteriosclerosis.

### Division of Lung Diseases

Lung diseases are among the leading causes of death and disability in the United States. Over 20 million persons have chronic bronchitis, emphysema, asthma, or other obstructive or interstitial lung diseases. In the pediatric area, pulmonary diseases accounted for 21 percent of all hospitalizations of children under 15 years of age in the United States in 1988.

As an underlying cause, lung diseases, excluding cancer, account for 198,000 deaths annually, and lung diseases are a contributing cause to perhaps an equal number of additional deaths. The lung disease problems addressed by the Institute cost the Nation about $53 billion in 1988, of which $26 billion was for health expenditures and $27 billion for lost productivity.

Activities of the Division of Lung Diseases (DLD) focus on research on the structure and function of the respiratory system, expansion of the knowledge base on specific lung diseases that constitute health problems, and application of basic knowledge to solve immediate and specific problems related to lung diseases.

Special emphasis has been given to asthma and asthma education. The Division recently solicited applications for research to develop interventions to control asthma in Black and Hispanic children. The Division is working closely with the Office of Prevention, Education and Control on the National Asthma Education Program, and a solicitation is being prepared to support research on treatment programs for childhood asthma. Other solicitations issued by the Division this fiscal year include research on beta-adrenergic modulation of airway function and the pathobiology of *Pneumocystis carinii* in the lung.

The Division currently supports Specialized Centers of Research (SCOR) programs in chronic diseases of the airways, respiratory disorders of neonates and children, occupational and immunologic lung diseases, pulmonary vascular diseases, adult respiratory failure, cystic fibrosis, and cardiopulmonary disorders of sleep. The Division announced a competition this year for new and renewal SCOR applications for research on chronic diseases of the airways, lung biology and disease in infants and children, and occupational and immunologic lung diseases.

Emphasis is also placed upon prevention programs; the Division seeks to bring the findings of pulmonary research to bear on the practice of medicine in communities through demonstration and education activities. Additionally, research training and career development represent a significant part of the Division's programs.

As required by legislation, the NHLBI applies not less than 15 percent of its funds to programs related to lung diseases.

### Division of Blood Diseases and Resources

Blood diseases involve both acute and chronic disorders that resulted in 293,000 deaths in 1989, including 285,000 deaths due to thrombotic disorders and 8,000 deaths due to diseases of the red blood cells and bleeding disorders. In 1988, thrombotic disorders and other blood diseases cost an estimated $37 billion, of which $18 billion was for health expenditures and $19 billion for lost productivity. Blood resources include nearly two dozen products transfused annually to patients, derived from more than 13 million units of whole blood collected from almost 9 million American donors. In 1987, an estimated 20 million units of blood products were transfused to 4 million patients. Adverse effects following blood transfusion include the development of non-A, non-B hepatitis in about 1-3 percent of blood and blood-product recipients. The most severe effects relate to the transmission of acquired immunodeficiency syndrome (AIDS) through such products. As of November 30, 1990, a cumulative total of 157,525 AIDS cases in the United States were reported, with at least 5,302 directly attributable to transfusion of blood or blood derivatives. The universal screening of donor blood for an antibody to the AIDS virus began in 1985. Screening for non-A, non-B hepatitis began in 1987 with the use of two indirect tests. Universal screening for hepatitis C virus began in 1990. These screening tests have greatly reduced the risk of infection to transfusion recipients.

The Division of Blood Diseases and Resources (DBDR) develops, administers, and coordinates programs that will reduce the morbidity and mortality caused by blood diseases and lead to the primary prevention of these diseases. A major responsibility is to ensure the adequacy and safety of the Nation's blood supply. A full range of activities, including studies of the transmission of disease through transfusion, development of methods to inactivate viruses in donated blood, and research on methods of donor counseling, is used to achieve this goal. The Division's overall responsibilities are met by an integrated and coordinated program of grants, contracts, training and career development awards, and academic awards. Specialized Centers of Research are supported in the areas of thrombosis and transfusion medicine and Comprehensive Centers in sickle cell disease. Special efforts have been made by the Division to disseminate research findings to the medical community through the support of consensus development conferences. Topics have included perioperative red cell transfusion, plasma transfusion, platelet transfusion therapy, diagnosis of deep-vein thrombosis, the impact of routine human immunodeficiency virus (HIV) antibody testing of blood and plasma donors on public health, and the screening of newborns for sickle cell disease.

### Division of Epidemiology and Clinical Applications

The Division of Epidemiology and Clinical Applications (DECA) has the primary responsibility for epidemiologic studies, clinical trials, prevention, and demonstration and education research in heart and vascular, lung, and blood diseases and for basic and applied research in behavioral medicine. The Division identifies research opportunities; stimulates and conducts research on the causes, prevention, diagnosis, and treatment of these diseases; and assesses the need for technologic development in the application of research findings in these areas. It evaluates and uses basic and clinical research findings in defined populations (such as occupational groups, schoolchildren, health professionals, and minorities) and community settings, with emphasis on studies of primary and secondary prevention in nonhospitalized patients or populations. The Division's activities cover the entire human lifespan, including studies on risk factors for coronary heart disease in schoolchildren and young adults and risk factors, morbidity, and mortality in middle-aged and elderly populations.

Examples of recently initiated DECA programs are:

- A Postprandial Lipoproteins and Atherosclerosis study to determine whether lipoproteins measured in the hours following a fatty meal are related to atherosclerosis. Atherosclerosis will be studied in patients with either coronary artery disease or diseases of the extracranial carotid arteries.
- A Child and Adolescent Trial of Cardiovascular Health (CATCH) to measure and compare the effects of school-based interventions for promoting long-term healthful behavior in elementary school children and adolescents to reduce their subsequent cardiovascular disease risk.
- A Randomized Trial to Study the Effects of Digitalis on Survival in Patients with Congestive Heart Failure to determine whether digitalis has a beneficial effect, a harmful effect, or no effect on mortality in patients with congestive heart failure.
- Studies to develop and test methods of recruitment to smoking cessation programs, methods of achieving cessation, and methods of maintaining cessation for minorities with cardiovascular and respiratory disease.
- An epidemiologic study of CVD and CHD risk factors in American Indians from three different geographic areas.
- A Cardiovascular Health Study in people aged 65-84 to determine the extent to which known risk factors for stroke and CHD predict these diseases in this age group and to identify other precipitants and predictors of mortality and functional impairment in patients with clinical CHD or stroke.
- A Coronary Artery Bypass Graft (CABG) Biobehavioral Study to evaluate physical, work, social, and emotional factors; neuropsychologic functioning; life satisfaction; family and marital relations; and health status in 750 men and women from several days presurgery to 5 years post-CABG.
- A study to test whether reduction in alcohol intake lowers systolic and/or diastolic blood pressure in individuals with mild hypertension who are nondependent moderate to heavy drinkers.

### Division of Intramural Research

The NHLBI Division of Intramural Research conducts clinical research on the normal and pathophysiologic functioning of the cardiac, pulmonary, blood, and endocrine systems and basic research on normal and abnormal cellular behavior at the molecular level. The research activities of the 16 laboratories and branches range from structural organic chemistry to cardiology. Major areas of interest include: the mechanisms of gene regulation, retroviral-mediated gene transfer and, ultimately, gene therapy; the molecular basis of lipoprotein dysfunctions and the atherogenic process; the molecular basis of diseases of the alveolar structures of the lung and the design of new therapeutic modalities; the cellular and molecular events underlying ischemic heart disease and myocardial hypertrophy; biochemical events associated with aging and certain pathologic processes; molecular, structural, and developmental aspects of muscle and nonmuscle contractile systems; the biochemistry and physiology of calcium channels; molecular and cellular processes for the conversion of metabolic energy into useful work; the molecular basis of transmembrane signaling; the pathophysiology of renal function at the cellular and molecular levels; the biochemistry of trace nutrients; enzyme kinetics, metabolic regulation, and protein chemistry; and the cellular and molecular basis of toxicities induced by drugs and other foreign compounds.

The Division of Intramural Research is located on the 300-acre NIH campus in Bethesda. It has a staff of about 440, including about 220 doctoral-level scientists, of whom about 70 are in tenured positions, one Nobel Laureate, and five members of the National Academy of Sciences. An additional 65 postdoctoral fellows are supported by Institute funds, and there are approximately 100 guest researchers. This combined staff of about 600 occupies a total space of about 100,000 square feet and has the use of 80 beds in the Clinical Center.

### Prevention, Education, and Control

The NHLBI Office of Prevention, Education and Control (OPEC) assists in transferring research findings and scientific consensus to health professionals and the public so that the information will be adapted appropriately as a part of health care practice and individual health behavior. In support of its mission, the OPEC develops, implements, and coordinates five large-scale health education programs in collaboration with Government and non-Government groups and the Divisions of the Institute.

The National High Blood Pressure Education Program (NHBPEP), initiated in 1972, was conceived as a cooperative effort between the NHLBI and a number of professional and voluntary health agencies to reduce death and disability related to high blood pressure. Educational efforts are targeted to professional, patient, and public audiences and focus on stimulating health promotion and disease prevention activities, developing and disseminating educational materials, and providing technical support to community health programs. Over the years, the program has developed a network of approximately 15 Federal agencies, 150 national organizations, 50 state health departments, and more than 2,000 community-based programs. The NHBPEP priorities for fiscal years 1990-1991 include: increased attention to improving blood pressure control among low-income and minority populations who are underserved by the health care system; and increased focus on activities to reduce mortality from stroke in the southeastern United States, an area known as "the stroke belt" because of its high rate of stroke mortality.

The National Cholesterol Education Program (NCEP) began in 1985. Its objective is to reduce the number of Americans with high blood cholesterol to help reduce illness and death from coronary heart disease. Drawing upon the NHBPEP model, the NCEP has established a coordinating committee of more than 35 national medical, public health, voluntary, and Government organizations to help plan, implement, and evaluate the program's efforts in professional, patient, and public education. In the past year, the NCEP released recommendations for improving the accuracy of cholesterol measurements and for encouraging the general population to adopt low-saturated fat, low-cholesterol eating patterns. A report on cholesterol levels in children will be released at the National Conference on Cholesterol and High Blood Pressure Control in April 1991.

The NHLBI Smoking Education Program was initiated in 1985 to reduce morbidity and mortality from tobacco-related cardiovascular and pulmonary diseases. In fiscal year 1990, the program continued its efforts to encourage health care providers to intervene with their smoking patients. Professional training opportunities and educational materials are being promoted to physicians, nurses, respiratory therapists, and health professions students through intermediary groups such as state health departments, professional societies, HMOs, and medical schools. A training videotape, resources guide, and respiratory therapist guide, as well as a state-specific data factsheet on smoking prevalence, are among the new products that are currently being disseminated by the program.

The National Blood Resource Education Program (NBREP), begun in October 1987, has two goals: to ensure an adequate supply of safe blood and blood components to meet the Nation's needs and to ensure that blood and blood components are transfused only when therapeutically appropriate. The NBREP coordinating committee, consisting of more than 30 national health-related organizations, was established to identify priority issues and program activities, and several professional and patient education activities have been carried out in the areas of blood donation, transfusion, and blood resource utilization. In FY 1990, the NBREP published a comprehensive guide to blood donor recruitment and retention, as well as a guide for nurses on blood transfusion. The program continues to distribute its expert reports to physicians on the use of red blood cells, platelets, and fresh frozen plasma and autologous blood.

The newest education program, the National Asthma Education Program (NAEP), was initiated in March 1989 to raise awareness of asthma as a serious chronic disease and to promote more effective management of asthma through patient and professional education. The coordinating committee of the NAEP, like those of the other national education programs, represents various national medical, public health, voluntary, and Government organizations. Educational materials for children and adults with asthma, developed for use by health professionals directing asthma education programs in their communities, are being promoted through the NAEP. Materials are also being targeted to the school environment. They address the important role of schools, families, and health professionals in asthma management.

An Ad Hoc Committee on Minority Populations, originally established in 1975 to facilitate communication between minority communities and the NHBPEP, today advises the Institute on minority issues related to all five health education programs. The committee, which includes 15 health professionals representing Native Americans, Asian/Pacific Islanders, Blacks, and Hispanics, works to improve the health status of all minorities in the United States. In FY 1990, the committee developed and distributed the *Directory of Minority Community Organizations* and began content planning for the 1992 Forum on Heart, Lung, and Blood Diseases in Minority Populations.

### International Activities

Since its beginning, the NHLBI has participated in international information exchanges. In 1972, additional opportunities for U.S. scientists to collaborate with scientists of other countries were created by the National Heart, Blood Vessel, Lung, and Blood Act. The growing impact of heart, blood vessel, lung, and blood diseases on the health of many nations in recent years has led to further sharing of research information and continued development of joint research projects with scientists in other countries.

Many of the Institute's international cooperative programs focus on new approaches to cardiovascular disease prevention and control. The NHLBI, the World Health Organization (WHO), and the American Heart Association cosponsored an Interdisciplinary Conference on Hypertension in Blacks in May 1990. The theme of the conference was "Sharing the Experience and Meeting the Challenges." Participants from Australia, Brazil, England, India, Israel, Jamaica, Japan, Kenya, Liberia, Nigeria, the People's Republic of China, Tanzania, and Zimbabwe discussed the roles played by stress, alcohol, salt, calcium, and genetics in the etiology of high blood pressure.

In recognition of its commitment to international cooperation, the NHLBI has been designated a WHO Collaborating Center for Research and Training in Cardiovascular Diseases for the Americas. The Institute provides funds and consultation to the Coordinating Center of the WHO study entitled Multinational Trends and Determinants in Cardiovascular Disease (MONICA). There are 41 MONICA projects in 27 countries. The Director, NHLBI, serves as an advisor to the WHO on a number of programs, and the NHLBI is cooperating with the WHO Regional Office for the Western Pacific in the development of plans for WHO prevention programs for the region. Information exchange continues with the Council of European Communities (CEC) and the Council of Europe (COE). The Director, NHLBI, is Vice President of the World Hypertension League (WHL); the U.S. National High Blood Pressure Education Program is working with the WHL in the common fight against hypertension.

NHLBI cooperative efforts under the bilateral agreement with the Federal Republic of Germany (F.R.G.) have focused on joint efforts in prevention and health education in cardiovascular diseases. A German National High Blood Pressure Education Program, modeled after the U.S. National High Blood Pressure Education Program, has been implemented as a result of the cooperative effort. Collaboration is also under way on fibrotic and immunologic lung diseases. Other U.S.-F.R.G. joint efforts involve health statistics, the issues of blood safety, and the outbreak of AIDS. Germany is participating in the Institute's longitudinal multicenter study on the pulmonary complications of HIV infection.

Scientists from the NHLBI and the French Institut National de la Sante et de la Recherche Medicale (INSERM) continue their joint research on the effects of neuropeptides on respiratory pathways, gene expression of mucin, bronchopulmonary infections, and metabolism of the high-density lipoprotein subfractions that protect against premature heart disease.

Cooperation with Japan continues under the U.S.-Japan Science and Technology Agreement signed in June 1988. The role of nutrition in the pathophysiology of hypertension is being studied, utilizing the stroke-prone hypertensive rat model. In these animals, certain diets have been shown to prevent the sequelae of hypertension. A joint study is now under way on the relationship of nutrition risk factor changes and maturation in children and young adults. U.S. and Japanese scientists are also using standardized techniques to measure atherosclerotic lesions in intracerebral arteries of U.S. and Japanese autopsy specimens. Comparisons of atherosclerotic lesions of coronary heart disease patients show more and larger lesions in the U.S. subjects than in the matched Japanese subjects.

Exchanges of scientists and joint scientific meetings continue under the aegis of the U.S.-Italy Agreement in Cardiovascular and Pulmonary Research. A number of topics have been explored jointly, including prostaglandin metabolism, noninvasive assessment of degree of atherosclerosis, blood lipids and lipoproteins, the role of coronary artery spasm in unstable angina pectoris, risk factor control of cardiovascular diseases, bronchoalveolar lavage, molecular biology of lung cells, factors triggering asthma, and asthma self-management education.

Cooperative research with China is being conducted under a bilateral government agreement signed in 1979. A joint study is under way on the epidemiology of cardiopulmonary diseases and their risk factors in urban and rural populations in north and south China. In China, intake of fats and salt is higher in the north than in the south, and prevalence rates of hypertension also show a north-south gradient that is opposite to that in the United States, where hypertension is more severe in the South than in the North.

Activities under the 1989 U.S.-Hungarian Technology Agreement focus on prevention and control of coronary heart disease and hypertension, cardiac surgery, and assessment of left ventricular function. A satellite computer link has been set up between the Hungarian Institute of Cardiology and the University of Washington to enable joint analysis of angiographic data. U.S.-Hungary cooperative pulmonary disease research focuses on the causes and contrasting trends of chronic obstructive pulmonary disease (COPD).

Two joint proposals for cooperation with Egypt were developed during 1989. The first is an integrated program in hypertension control, and the other is a study that addresses the problems of lung disease related to smoking.

Collaboration with Poland was initiated in 1978 under the U.S.-Poland Agreement for Health Cooperation, which encompasses basic, clinical, and epidemiologic research. A study of the prevalence of cardiovascular disease and its risk factors is under way in Warsaw and Cracow utilizing Lipid Research Clinics (LRC) methodology. LRC methodology is also being used in studies in Canada, China, and the U.S.S.R. "The Cracow Prospective Study" on COPD utilizes the same protocols as an Arizona study on COPD. Data from the two studies are being analyzed jointly. Joint basic studies on prostaglandin metabolism have been carried out as well as clinical research on cardiomyopathies.

The U.S.-Spain Joint Committee for Scientific and Technological Cooperation provides funding to U.S. and Spanish investigators for collaborative research projects on protein metabolism, blood lipids and lipoproteins, respiratory disease, von Willebrand's disease, thrombolysis in acute myocardial infarction, renal function and hypertension, and cardiovascular epidemiology and prevention.

U.S.-U.S.S.R. joint research in the cardiopulmonary area is conducted under two bilateral agreements. Cooperation involves nine areas: Pathogenesis of Arteriosclerosis, Management of Ischemic Heart Disease, Cardiovascular Biology and Medicine, Sudden Cardiac Death, Blood Transfusion and Blood Resources, Hypertension, Cardiopulmonary Epidemiology and Prevention, Pulmonary Biology and Medicine, and Artificial Heart Research and Development.

The NHLBI also conducts cooperative activities with scientists from Argentina, Brazil, Czechoslovakia, Greece, India, Korea, Pakistan, Thailand, Turkey, Venezuela, and Taiwan.

Pages 143 and 144 show international projects directly funded in FY 1990 by the NHLBI using either the grant or the contract mechanism.

# 3. Important Events

**June 16, 1948.** President Harry S Truman signs the National Heart Act, creating the National Heart Institute (NHI) in the Public Health Service (PHS), with the National Advisory Heart Council as its advisory body.

**July 7, 1948.** Dr. Paul Dudley White is selected to be "Executive Director of the National Advisory Heart Council and Chief Medical Advisor to the National Heart Institute" under Section 4b of the National Heart Act.

**August 1, 1948.** The NHI is established as one of the National Institutes of Health (NIH) by Surgeon General Leonard A. Scheele. As legislated in the National Heart Act, the NHI assumes responsibility for heart research, training, and administration. Intramural research projects in cardiovascular diseases and gerontology conducted elsewhere in the NIH are transferred to the NHI. The Director of the NHI assumes all leadership for the total PHS heart program. Dr. Cassius J. Van Slyke is appointed as the first Director of the NHI.

**August 29, 1948.** Surgeon General Scheele announces the membership of the first National Advisory Heart Council. Varying terms of membership for the 16-member Council commence September 1.

**September 8, 1948.** The National Advisory Heart Council holds its first meeting.

**January 1949.** Cooperative Research Units are established at four institutions: the University of California, the University of Minnesota, Tulane University, and Massachusetts General Hospital. Pending completion of the NHI's own research organization and facilities, the Units are jointly financed by the NIH and the institutions.

**July 1, 1949.** The NHI Intramural Research Program is established and organized on three general research levels consisting of three laboratory sections, five laboratory-clinical sections, and four clinical sections. The Heart Disease Epidemiology Study at Framingham, Massachusetts, is transferred from the Bureau of State Services, PHS, to the NHI.

**January 18-20, 1950.** The NHI and the American Heart Association jointly sponsor the first National Conference on Cardiovascular Diseases in Washington, D.C., to summarize current knowledge and to make recommendations concerning further progress against heart and blood vessel diseases.

**December 1, 1952.** Dr. James Watt is appointed Director of NHI, succeeding Dr. Van Slyke, who is appointed Associate Director of the NIH.

**July 6, 1953.** The Clinical Center admits its first patient for heart disease research.

**July 1, 1957.** The first members of the NHI Board of Scientific Counselors begin their terms. The Board was established in 1956 "to provide advice on matters of general policy, particularly from a long-range viewpoint, as they relate to the intramural research program."

**February 19, 1959.** The American Heart Association and the NHI present a report to the Nation—"A Decade of Progress Against Cardiovascular Disease."

**April 21, 1961.** The President's Conference on Heart Disease and Cancer, whose participants on March 15 were requested by President John F. Kennedy to assist "in charting the Government's further role in a national attack on these diseases," convenes at the White House and submits its report.

**September 11, 1961.** Dr. Ralph E. Knutti is appointed Director of the NHI, succeeding Dr. Watt, who becomes head of international activities for the PHS.

**December 30, 1963.** February is designated as "American Heart Month" by a unanimous joint resolution of the Congress with approval from President Lyndon B. Johnson.

**November 22-24, 1964.** The Second National Conference on Cardiovascular Diseases is held in Washington, D.C., cosponsored by the American Heart Association, the NHI, and the

Heart Disease Control Program of the PHS, to evaluate progress since the 1950 Conference and to assess needs and goals for continued and accelerated growth against heart and blood vessel diseases.

**December 9, 1964.** The President's Commission on Heart Disease, Cancer, and Stroke, appointed by President Lyndon B. Johnson on March 7, 1964, submits its report to "recommend steps that can be taken to reduce the burden and incidence of these diseases."

**August 1, 1965.** Dr. William H. Stewart assumes the Directorship of the NHI upon Dr. Knutti's retirement.

**September 24, 1965.** Dr. William H. Stewart, NHI Director, is named Surgeon General of the PHS.

**October 6, 1965.** A fiscal year 1966 Supplemental Appropriations Act (P.L. 89-199) allocates funds to implement the recommendations of the President's Commission on Heart Disease, Cancer, and Stroke that fall within existing legislative authorities. The NHI is given $5.05 million for new clinical training programs, additional graduate training grants, cardiovascular clinical research centers on cerebrovascular disease and thrombotic and hemorrhagic disorders, and planning grants for future specialized cardiovascular centers.

**March 8, 1966.** Dr. Robert P. Grant succeeds Dr. Stewart as Director of the NHI. Dr. Grant serves until his death on August 15, 1966.

**November 6, 1966.** Dr. Donald S. Fredrickson is appointed Director of the NHI.

**March 15, 1968.** Dr. Theodore Cooper succeeds Dr. Fredrickson as Director of the NHI, the latter electing to return to research activities with the Institute.

**October 16, 1968.** Dr. Marshall W. Nirenberg is awarded a Nobel Prize in physiology for discovering the key to deciphering the genetic code. Dr. Nirenberg, chief of the NHI Laboratory of Biochemical Genetics, is the first Nobel laureate at the NIH and first Federal employee to receive a Nobel Prize.

**October 26, 1968.** The NHI receives the National Hemophilia Foundation's Research and Scientific Achievement Award for its "medical leadership. . ., tremendous stimulation and support of research activities directly related to the study and treatment of hemophilia."

**November 14, 1968.** The 20th anniversary of the NHI is commemorated at the White House under the auspices of President Johnson and other distinguished guests.

**August 12, 1969.** A major NHI reorganization plan creates five program branches along disease category lines in extramural programs (arteriosclerotic disease, cardiac disease, pulmonary disease, hypertension and kidney diseases, and thrombosis and hemorrhagic diseases), a Therapeutic Evaluations Branch and Epidemiology Branch under the associate director for clinical applications, and three offices in the Office of the Director (heart information, program planning, and administrative management).

**November 10, 1969.** The NHI is redesignated by the Secretary, Health, Education, and Welfare (HEW), as the National Heart and Lung Institute (NHLI), reflecting a broadening scope of its functions.

**July 9, 1970.** Dr. Theodore Cooper, Director of the NHLI, convenes a task force to develop a long-range plan to combat arteriosclerosis. The goal is a program focused on prevention and control of the disorder and effective treatment of its complications.

**February 18, 1971.** President Richard M. Nixon's Health Message to Congress identifies sickle cell anemia as a high priority disease and calls for increased Federal expenditures. The Assistant Secretary for Health and Scientific Affairs, HEW, is assigned lead-agency responsibility for coordination of the National Sickle Cell Disease Program at the NIH and NHLI.

**June 1971.** *The Report of the Task Force on Arteriosclerosis* summarizes the results of a year of deliberations. Volume I of the report addresses general aspects of the problem and presents the major conclusions and recommendations in nontechnical language. Volume II contains technical information on the current state of knowledge and conclusions and recommendations in each of the following areas: atherogenesis, presymptomatic atherosclerosis, overt atherosclerosis, and rehabilitation.

**May 16, 1972.** The National Sickle Cell Anemia Control Act (P.L. 92-294) provides for a national diagnosis, control, treatment, and research program. The act does not mention the NHLI but has special pertinence because the Institute has been designated to coordinate the National Sickle Cell Disease Program.

**June 12, 1972.** Elliot Richardson, Secretary, HEW, approves a nationwide program for high blood pressure information and education and appoints two committees to implement the program: the Hypertension Information and Education Advisory Committee, chaired by the Director, NIH, and the Interagency Working Group, chaired by the Director, NHLI. A High Blood Pressure Information Center is established within the NHLI Office of Information to collect and disseminate public and professional information about the disease.

**July 1972.** The NHLI launches its National High Blood Pressure Education Program, a program of patient and professional education that has as its goal to reduce death and disability related to high blood pressure.

**July 14, 1972.** Secretary Richardson approves a reorganization of the NHLI, elevating the Institute to Bureau status within the NIH and comprising seven division-level components: Office of the Director, Division of Heart and Vascular Diseases, Division of Lung Diseases, Division of Blood Diseases and Resources, Division of Intramural Research, Division of Technological Applications, and Division of Extramural Affairs.

**September 19, 1972.** The National Heart, Blood Vessel, Lung, and Blood Act of 1972 (P.L. 92-423) expands the authority of the Institute to advance the national attack upon the diseases within its mandate. The act calls for intensified and coordinated Institute activities to be planned by the Director and reviewed by the National Heart and Lung Advisory Council.

**July 24, 1973.** The first Five-Year Plan for the National Heart, Blood Vessel, Lung, and Blood Program is transmitted to the President and to Congress.

**December 17, 1973.** The National Heart and Lung Advisory Council completes its first Annual Report on the National Program.

**February 13, 1974.** The Director of the NHLI forwards his First Annual Report on the National Program to the President for transmittal to Congress.

**April 5, 1974.** The Assistant Secretary for Health, HEW, authorizes release of the Report to the President by the President's Advisory Panel on Heart Disease. The report of the 20-member panel, chaired by Dr. John S. Millis, includes a survey of the problem of heart and blood vessel disorders and panel recommendations to reduce illness and death from them.

**August 2, 1974.** The Secretary, HEW, approves regulations governing the establishment, support, and operation of National Research and Demonstration Centers for heart, blood vessel, lung, and blood diseases, which implement Section 415(b) of the PHS Act, as amended by the National Heart, Blood Vessel, Lung, and Blood Act of 1972: (1) to carry out basic and clinical research on heart, blood vessel, lung, and blood diseases; (2) to provide demonstrations of advanced methods of prevention, diagnosis, and treatment; and (3) to supply a training source for scientists and physicians concerned with the diseases.

**September 16, 1975.** Dr. Robert I. Levy is appointed Director of the NHLI, succeeding Dr. Theodore Cooper, who was appointed Deputy Assistant Secretary for Health, HEW, on April 19, 1974.

**June 25, 1976.** Legislation amending the Public Health Service Act (P.L. 94-278) changes the name of the National Heart and Lung Institute to the National Heart, Lung, and Blood Institute (NHLBI) and provides for an expansion in blood-related activities within the Institute and throughout the National Heart, Blood Vessel, Lung, and Blood Program.

**August 1, 1977.** The Biomedical Research Extension Act of 1977 (P.L. 95-83) reauthorizes the programs of the National Heart, Lung, and Blood Institute, with continued emphasis on both the National Program and related prevention and dissemination activities.

**February 1978.** The National Heart, Lung, and Blood Institute and the American Heart Association jointly celebrate their 30th anniversary.

**September 1979.** The Task Force on Hypertension, established in September 1975 to assess the current state of hypertension research, completes its indepth survey and recommendations for improved prevention, treatment, and control in 14 major areas. The recommendations are intended to guide the NHLBI in its future efforts.

**November 1979.** The results of the Hypertension Detection and Followup Program, a major clinical trial started in 1971, provide evidence that tens of thousands of lives are being saved through treatment of mild hypertension and that perhaps thousands more could be saved annually if all people with mild hypertension were under treatment.

**November 21, 1980.** The Albert Lasker Special Public Health Award is presented to the National Heart, Lung, and Blood Institute for its Hypertension Detection and Followup Program, "which stands alone among clinical studies in its profound potential benefit to millions of people."

**December 17, 1980.** The Health Programs Extension Act of 1980 (P.L. 96-538) reauthorizes the National Heart, Lung, and Blood Institute, with continued emphasis on both the National Program and related prevention programs.

**September 8, 1981.** The Working Group on Arteriosclerosis, convened in 1978 to assess present understanding, to highlight unresolved problems, and to emphasize opportunities for future research in arteriosclerosis, completes its report. Volume I of the report presents conclusions and recommendations in nontechnical language. Volume II provides indepth substantial basis for the conclusions and recommendations contained in Volume I.

**October 2, 1981.** The Beta-Blocker Heart Attack Trial (BHAT) demonstrates benefits to those in the trial who received the drug propranolol compared with the control group.

**July 6, 1982.** Dr. Claude Lenfant is appointed Director of the NHLBI. He succeeds Dr. Robert I. Levy, who was appointed Dean of the School of Medicine and Vice President for Health Sciences at Tufts University.

**October 26, 1983.** The Coronary Artery Surgery Study (CASS) results are released. They demonstrate that mildly symptomatic patients with coronary artery disease can safely defer coronary artery bypass surgery until symptoms worsen.

**January 12, 1984.** The results of the Lipid Research Clinics Coronary Primary Prevention Trial (LRC-CPPT) are released. They establish conclusively that reducing total blood cholesterol reduces the risk of coronary heart disease in men at increased risk because of elevated cholesterol levels. Each 1 percent decrease in cholesterol can be expected to reduce heart attack risk by 2 percent.

**April-September 1984.** The Tenth Report of the Director, NHLBI, commemorates the 10th anniversary of the passage of the National Heart, Blood Vessel, Lung, and Blood Act. The publication, which consists of five volumes, reviews 10 years of research progress and presents a 5-year research plan for the National Program.

**April 1984.** The Division of Epidemiology and Clinical Applications is created. It provides the Institute with a single focus on clinical trials; prevention, demonstration, and education programs; behavioral medicine; nutrition; epidemiology; and biometry. It also provides new opportunities to examine the interrelationships of cardiovascular, respiratory, and blood diseases.

**November 1984.** An NHLBI-NIH Clinical Center interagency agreement for studies on the transmission of HTLV-III from humans to chimpanzees leads to the first definitive evidence that HIV is transmitted by blood transfusion.

**April 1985.** Results of Phase I of the Thrombolysis in Myocardial Infarction (TIMI) trial comparing streptokinase (SK) with tissue plasminogen activator (rt-PA) produced by recombinant means are published. The new thrombolytic agent rt-PA is approximately twice as effective as SK in opening thrombosed coronary arteries.

**October 1985.** The NHLBI Smoking Education Program begins. Its objective is to increase health care provider awareness about clinical opportunities for smoking cessation programs, techniques that can be used within health care settings, and resources that can be used within communities to expand and reinforce such efforts.

**November 1985.** The National Cholesterol Education Program is inaugurated by the NHLBI. The program cites among its objectives an increase in awareness among health professionals that elevated blood cholesterol is a cause of coronary heart disease and that reducing elevated blood cholesterol levels will contribute to the reduction of coronary heart disease.

**June 1986.** Results of the Prophylactic Penicillin Trial are released. They demonstrate the efficacy of prophylactic penicillin therapy in reducing the morbidity and mortality associated with pneumococcal infections in children with sickle cell disease.

**September 18, 1986.** The NHLBI sponsors events on the NIH campus in conjunction with the meeting of the X World Congress of Cardiology in Washington, D.C. Activities include a special exhibit at the National Library of Medicine entitled "American Contributions to Cardiovascular Medicine and Surgery" and two symposia—"New Dimensions in Cardiovascular Disease Research" and "Cardiovascular Nursing and Nursing Research."

**December 17, 1986.** The citizens of Framingham, Massachusetts, are presented a Tribute by the Assistant Secretary for Health, HHS, for their participation in the Framingham Heart Study over the past 40 years.

**September 1987.** The NHLBI commemorates the centennial of the NIH and the 40th anniversary of the Institute's inception with a series of events for the public, the scientific community, and NHLBI employees. Two publications prepared for the Institute's anniversary, *Forty Years of Achievement in Heart, Lung, and Blood Research* and *A Salute to the Past: A History of the National Heart, Lung, and Blood Institute,* document significant Institute contributions to research and summarize recollections about the Institute's 40-year history.

**October 1987.** The NHLBI launches the National Blood Resource Education Program, with the objective to ensure that an adequate supply of safe blood and blood components exists to meet the Nation's needs and that blood and blood components are transfused only when therapeutically appropriate.

**April 1988.** The NHLBI initiates its Minority Research Supplements program. The program provides supplemental funds to ongoing research grants for support of minority investigators who are added to the research teams.

**September 1988.** Acquired immunodeficiency syndrome research is added to the National Heart, Blood Vessel, Lung, and Blood Diseases and Blood Resources Program. It is the first area of research to be added since the Program was established in 1973.

**September 1988.** The NHLBI funds the first of its new Programs of Excellence in Molecular Biology, designed to foster the study of the organization, modification, and expression of the genome, in areas of importance to the Institute, and to encourage investigators to become skilled in the experimental strategies and techniques of modern molecular biology.

**September 1988.** The Strong Heart Study is initiated. This 3-year study of cardiovascular diseases (CVD) in American Indians focuses on CVD morbidity and mortality rates and distribution of CVD risk factors in three geographically diverse Indian groups.

**October 1988.** The National Marrow Donor Program is transferred from the Department of the Navy to the NHLBI. The program, which serves as a focal point for bone marrow research, includes a national registry of volunteers who have offered to donate marrow for transplant to patients not having suitably matched relatives.

**March 1989.** The NHLBI initiates a National Asthma Education Program to raise awareness of asthma as a serious chronic disease and to promote more effective management of asthma through patient and professional education.

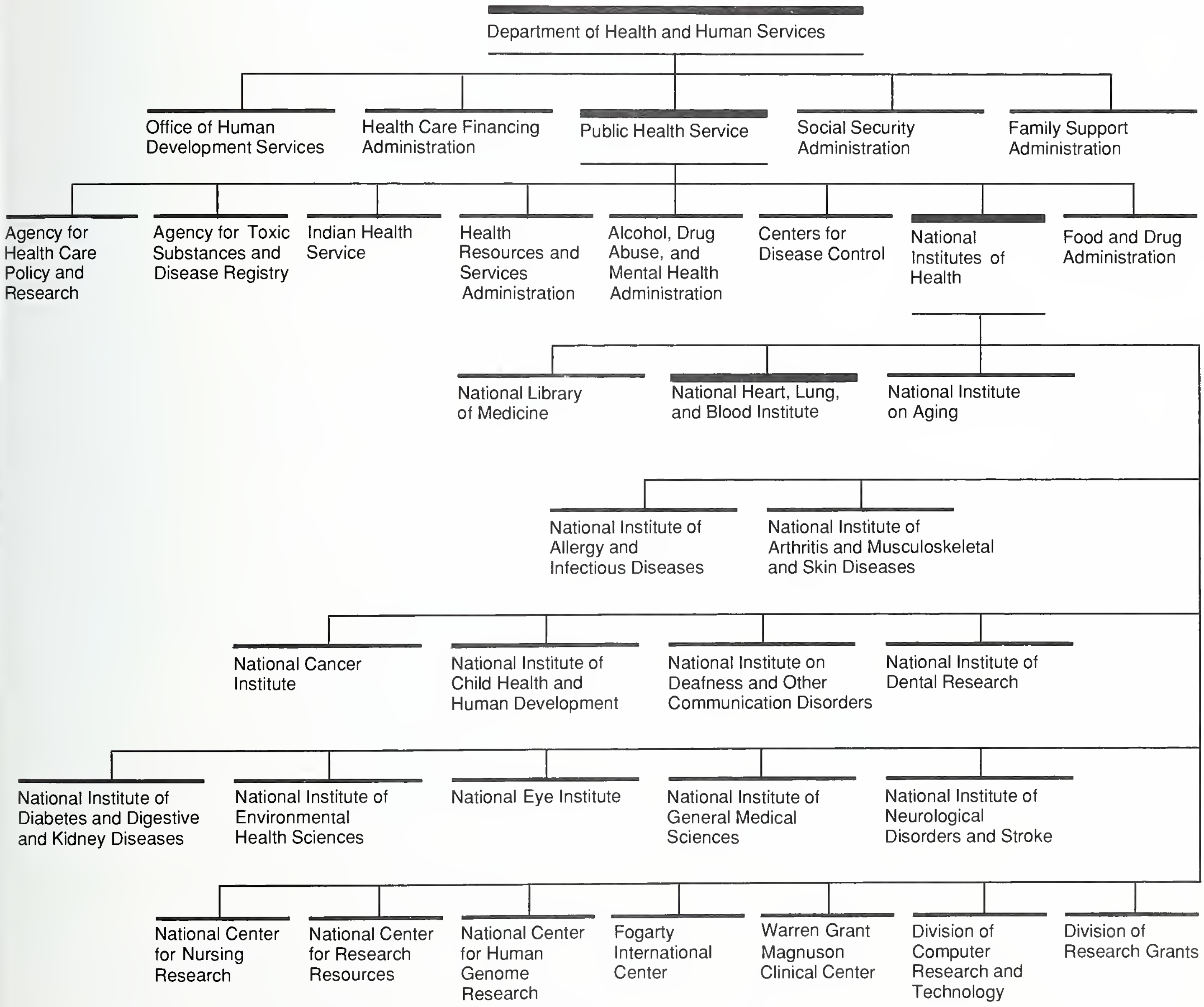
**May 1989.** The NHLBI MARC Summer Research Training Program is initiated to provide an opportunity for MARC Honors Scholars to work with researchers in the NHLBI intramural laboratories.

**November 1989.** The Task Force on Atherosclerosis and the Task Force on Hypertension are initiated to review advances in these fields over the past decade and to develop scientific priorities and comprehensive plans for support of atherosclerosis and hypertension research for the next decade.

**September 14, 1990.** First human gene therapy protocol in history is undertaken at NIH. A team of scientists, led by W. French Anderson, NHLBI, and R. Michael Blaese, National Cancer Institute, insert into a patient's cells a normal gene to compensate for a defective gene that left the patient's cells unable to produce an enzyme essential to the functioning of the body's immune system.

# 4. Organizational Structure

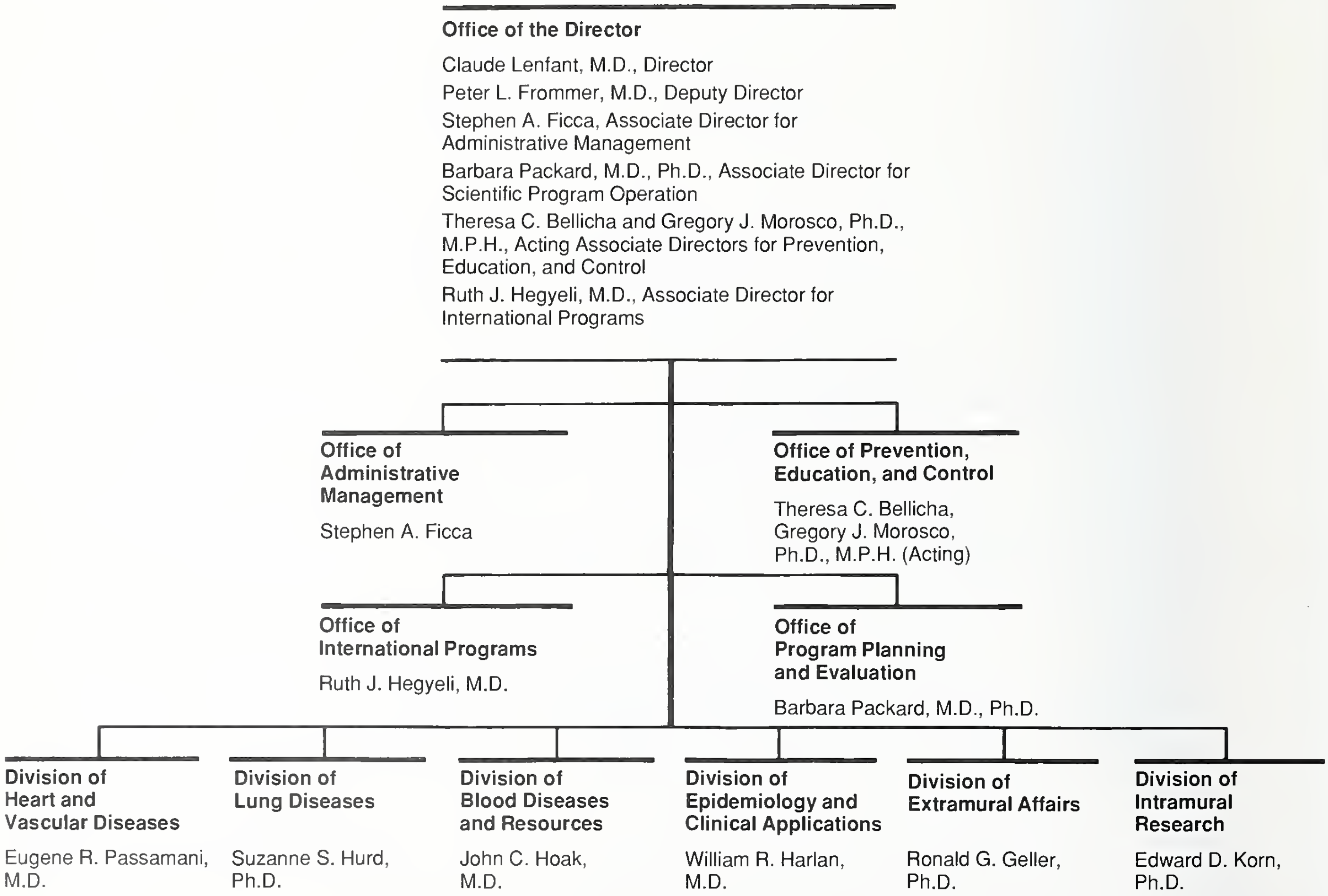
## Location of the NHLBI in the Department of Health and Human Services


Department of Health and Human Services
Office of Human Development Services
Health Care Financing Administration
Public Health Service
Social Security Administration
Family Support Administration
Agency for Health Care Policy and Research
Agency for Toxic Substances and Disease Registry
Indian Health Service
Health Resources and Services Administration
Alcohol, Drug Abuse, and Mental Health Administration
Centers for Disease Control
National Institutes of Health
Food and Drug Administration
National Library of Medicine
National Heart, Lung, and Blood Institute
National Institute on Aging
National Institute of Allergy and Infectious Diseases
National Institute of Arthritis and Musculoskeletal and Skin Diseases
National Cancer Institute
National Institute of Child Health and Human Development
National Institute on Deafness and Other Communication Disorders
National Institute of Dental Research
National Institute of Diabetes and Digestive and Kidney Diseases
National Institute of Environmental Health Sciences
National Eye Institute
National Institute of General Medical Sciences
National Institute of Neurological Disorders and Stroke
National Center for Nursing Research
National Center for Research Resources
National Center for Human Genome Research
Fogarty International Center
Warren Grant Magnuson Clinical Center
Division of Computer Research and Technology
Division of Research Grants

## The National Heart, Lung, and Blood Institute

The National Heart, Lung, and Blood Institute provides leadership for a national program in diseases of the heart, blood vessels, lungs, and blood, and in the uses and the management of blood resources. It plans, fosters, and supports, through research in its own laboratories and through extramural research grants and contracts, an integrated and coordinated program that includes basic and clinical investigations, clinical trials, and demonstration and education projects relating to the causes, diagnosis, treatment, and prevention of heart, blood vessel, lung, and blood diseases. The program includes studies of the clinical uses of blood and all aspects of the management of blood resources. The Institute is also responsible for planning and directing research on the development, trial, and evaluation of new drugs and devices for prevention and treatment and on the rehabilitation of patients. In addition, the Institute supports research training and career development in basic and clinical research in its disease areas and in transfusion medicine.

The Institute works with other NIH Institutes and Federal agencies in programs that include hypertension, stroke, respiratory distress, and sickle cell anemia. The Institute also maintains continuing relationships with institutions and professional associations; international, national, state, and local officials; and voluntary agencies and organizations. For health professionals and the lay public, the Institute conducts educational programs, with special emphasis on collecting and disseminating materials on disease prevention.



**Office of the Director**

Claude Lenfant, M.D., Director
Peter L. Frommer, M.D., Deputy Director
Stephen A. Ficca, Associate Director for Administrative Management
Barbara Packard, M.D., Ph.D., Associate Director for Scientific Program Operation
Theresa C. Bellicha and Gregory J. Morosco, Ph.D., M.P.H., Acting Associate Directors for Prevention, Education, and Control
Ruth J. Hegyeli, M.D., Associate Director for International Programs

**Office of Administrative Management**

Stephen A. Ficca

**Office of Prevention, Education, and Control**

Theresa C. Bellicha, Gregory J. Morosco, Ph.D., M.P.H. (Acting)

**Office of International Programs**

Ruth J. Hegyeli, M.D.

**Office of Program Planning and Evaluation**

Barbara Packard, M.D., Ph.D.

**Division of Heart and Vascular Diseases**

Eugene R. Passamani, M.D.

**Division of Lung Diseases**

Suzanne S. Hurd, Ph.D.

**Division of Blood Diseases and Resources**

John C. Hoak, M.D.

**Division of Epidemiology and Clinical Applications**

William R. Harlan, M.D.

**Division of Extramural Affairs**

Ronald G. Geller, Ph.D.

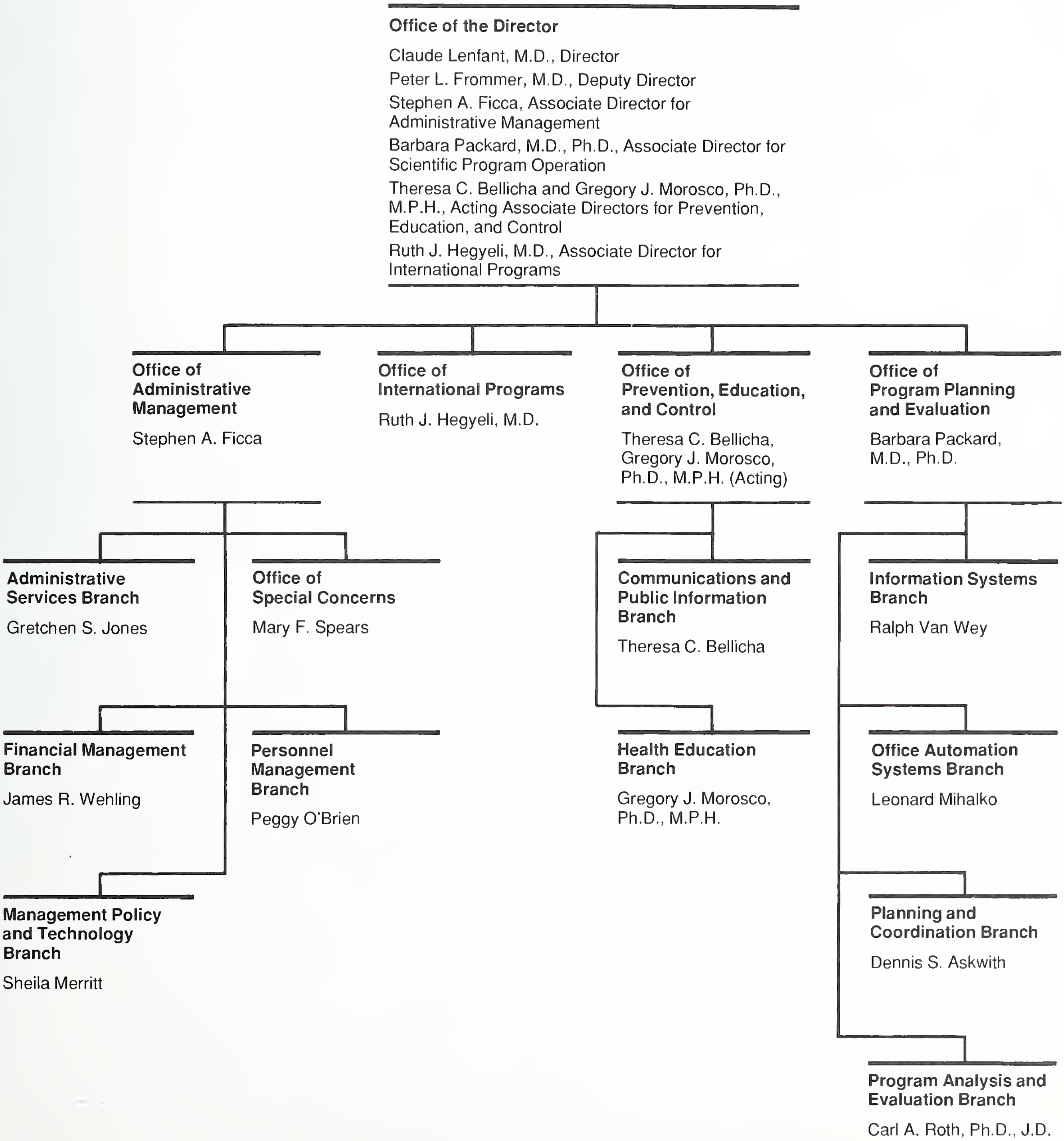
**Division of Intramural Research**

Edward D. Korn, Ph.D.

## Office of the Director

The Office of the Director develops and provides leadership for the National Heart, Blood Vessel, Lung, and Blood Diseases and Blood Resources Program, including the coordination of all related Federal health programs. It provides overall planning, direction, coordination, and evaluation of the Institute's programs.

The Office of the Director collects, develops, and disseminates information on the diseases of the heart, lung, and blood and on transfusion medicine, with emphasis upon factors in disease prevention, and conducts and fosters educational programs for scientists and clinicians. It provides leadership in the transfer and assessment of information for the scientific community and the lay public and establishes internal Institute policy for program and administrative operations, maintaining surveillance over their implementation.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Theresa C. Bellicha and Gregory J. Morosco, Ph.D., M.P.H., Acting Associate Directors for Prevention, Education, and Control
Ruth J. Hegyeli, M.D., Associate Director for International Programs
**Office of Administrative Management**
Stephen A. Ficca
**Office of International Programs**
Ruth J. Hegyeli, M.D.
**Office of Prevention, Education, and Control**
Theresa C. Bellicha, Gregory J. Morosco, Ph.D., M.P.H. (Acting)
**Office of Program Planning and Evaluation**
Barbara Packard, M.D., Ph.D.
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Gretchen S. Jones
**Office of Special Concerns**
Mary F. Spears
**Financial Management Branch**
James R. Wehling
**Personnel Management Branch**
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**Management Policy and Technology Branch**
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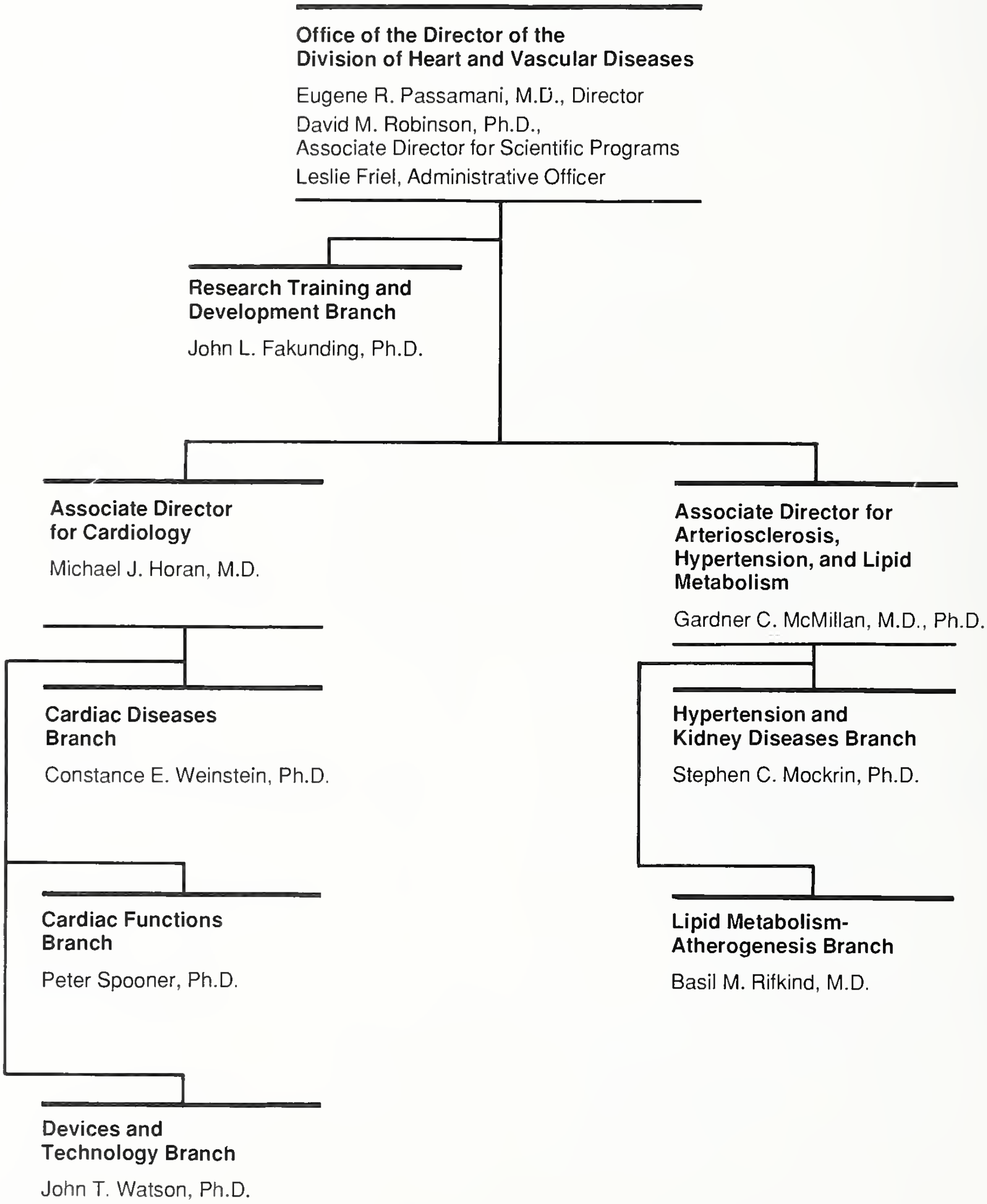
**Information Systems Branch**
Ralph Van Wey
**Office Automation Systems Branch**
Leonard Mihalko
**Planning and Coordination Branch**
Dennis S. Askwith
**Program Analysis and Evaluation Branch**
Carl A. Roth, Ph.D., J.D.

## Division of Heart and Vascular Diseases

The Division of Heart and Vascular Diseases (DHVD) plans and directs the Institute's research grant, contract, and training programs in heart and vascular diseases, encompassing basic research, targeted research, national cardiovascular centers, technological development, and application of research findings.

The DHVD maintains surveillance over developments in its program area and assesses the national need for research on the causes, prevention, diagnosis, and treatment of cardiovascular diseases; technological development; application of research findings; and research training and development in these areas.

The Division maintains the necessary scientific management capability to foster and guide an effective attack upon cardiovascular diseases.



**Office of the Director of the Division of Heart and Vascular Diseases**

Eugene R. Passamani, M.D., Director
David M. Robinson, Ph.D.,
Associate Director for Scientific Programs
Leslie Friel, Administrative Officer

**Research Training and Development Branch**

John L. Fakunding, Ph.D.

**Associate Director for Cardiology**

Michael J. Horan, M.D.

**Cardiac Diseases Branch**

Constance E. Weinstein, Ph.D.

**Cardiac Functions Branch**

Peter Spooner, Ph.D.

**Devices and Technology Branch**

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**Associate Director for Arteriosclerosis, Hypertension, and Lipid Metabolism**

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**Hypertension and Kidney Diseases Branch**

Stephen C. Mockrin, Ph.D.

**Lipid Metabolism-Atherogenesis Branch**

Basil M. Rifkind, M.D.

## Division of Lung Diseases

The Division of Lung Diseases (DLD) plans and directs the Institute's research grant, contract, and training programs in lung diseases, encompassing basic research, targeted research, clinical trials and demonstrations, pulmonary centers, technological development, and application of research findings.

The DLD maintains surveillance over developments in its program area and assesses the national need for research on the causes, prevention, diagnosis, and treatment of lung diseases; technology development; application of research findings; and research training and development in these areas. The Division also supports research on pulmonary complications of AIDS and on the use of molecular biology techniques for investigation of lung diseases.

The Division maintains the necessary scientific management capability to foster and guide an effective attack upon lung diseases.

**Office of the Director of the Division of Lung Diseases**

Suzanne S. Hurd, Ph.D., Director
Carol E. Vreim, Ph.D., Associate Director for Scientific Program Operations
J. Sri Ram, Ph.D., Special Assistant to the Director
Loretta A. Layton, Administrative Officer

**Airways Diseases Branch**

James P. Kiley, Ph.D.

**Interstitial Lung Diseases Branch**

Anthony R. Kalica, Ph.D.

**Prevention, Education, and Research Training Branch**

Sydney R. Parker, Ph.D.

**Structure and Function Branch**

Dorothy B. Gail, Ph.D.

## Division of Blood Diseases and Resources

The Division of Blood Diseases and Resources (DBDR) plans and directs the Institute's research grant, contract, and training programs in blood diseases and resources, encompassing basic research, targeted research, clinical trials and demonstrations, technological development, and application of research findings.

The DBDR maintains surveillance over developments in its program area and assesses the national need for research on the causes, prevention, diagnosis, and treatment of blood diseases and on transfusion medicine; technological development; application of research findings; and research training and development.

The Division conducts research and demonstrations to improve the national systems of blood procurement, management, and distribution. Much of the Division's AIDS-related research is in the blood transfusion area.

The DBDR participates in Federal sickle cell disease activities and operates a national clearinghouse for information on sickle cell disease.

The DBDR manages the National Marrow Donor Program, which maintains a register of typed volunteers willing to donate marrow to an unrelated patient. The Program also searches the register for tissue matches on request from a marrow transplant center and arranges for marrow harvesting and shipment.

The Division maintains the necessary scientific management capability to foster and guide an effective attack on blood diseases and to manage blood resources.

**Office of the Director of the Division of Blood Diseases and Resources**

John C. Hoak, M.D., Director
Carol H. Letendre, Ph.D., Associate Director for Scientific Programs
Fann Harding, Ph.D., Assistant to the Director for Research Training
Paul R. McCurdy, M.D., Special Assistant for Clinical Hematology
Judith B. Ireland, Administrative Officer

**Blood Diseases Branch**

Alan S. Levine, Ph.D.

**Blood Resources Branch**

George J. Nemo, Ph.D.

**Program Planning and Prevention Branch**

Allan W. Czarra

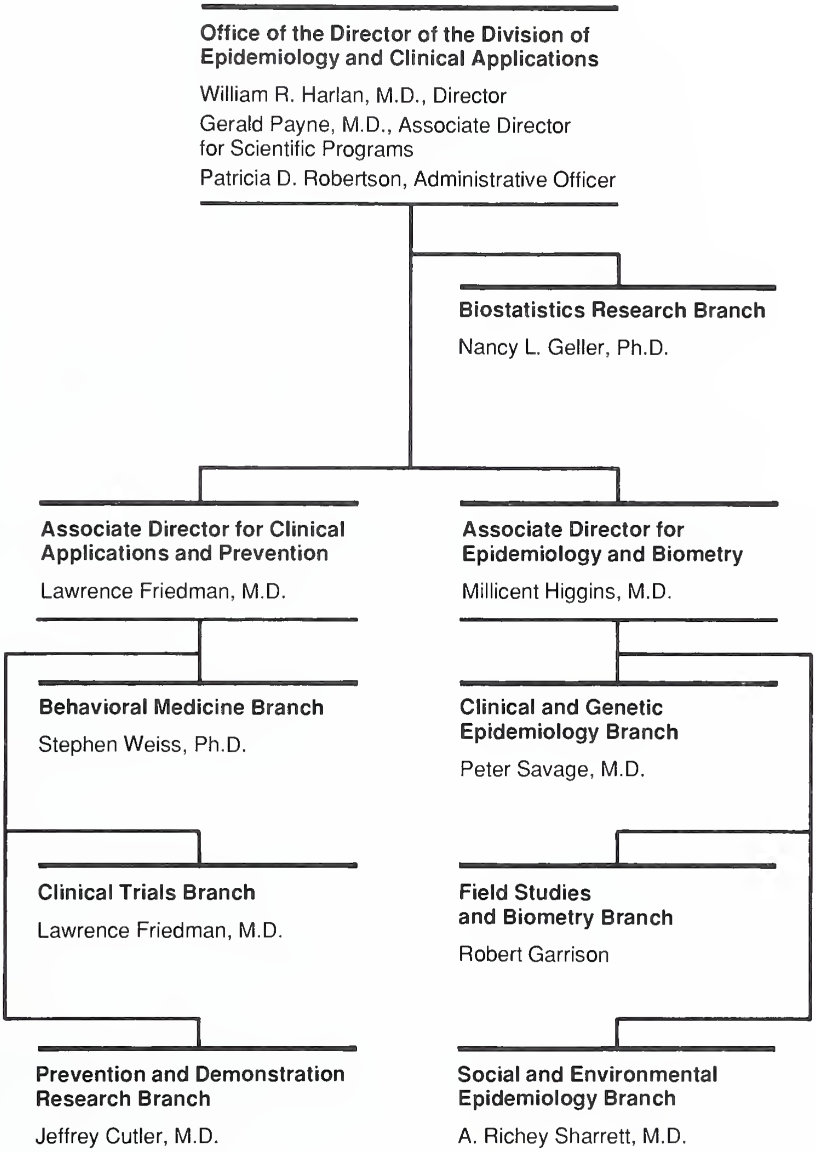
**Sickle Cell Disease Branch**

Clarice D. Reid, M.D.

## Division of Epidemiology and Clinical Applications

The Division of Epidemiology and Clinical Applications (DECA) plans and directs a program of epidemiological studies, clinical trials, basic and applied behavioral research, demonstration and education research, and projects for disease prevention and health promotion in heart, vascular, pulmonary, and blood diseases and blood resources.

The DECA maintains surveillance over developments in its program area and assesses the national need for research on the prevention, diagnosis, and treatment of disease by maintaining the necessary scientific management capability to foster and guide an effective attack upon them.


**Office of the Director of the Division of Epidemiology and Clinical Applications**
William R. Harlan, M.D., Director
Gerald Payne, M.D., Associate Director for Scientific Programs
Patricia D. Robertson, Administrative Officer
**Biostatistics Research Branch**
Nancy L. Geller, Ph.D.
**Associate Director for Clinical Applications and Prevention**
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**Prevention and Demonstration Research Branch**
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**Social and Environmental Epidemiology Branch**
A. Richey Sharrett, M.D.

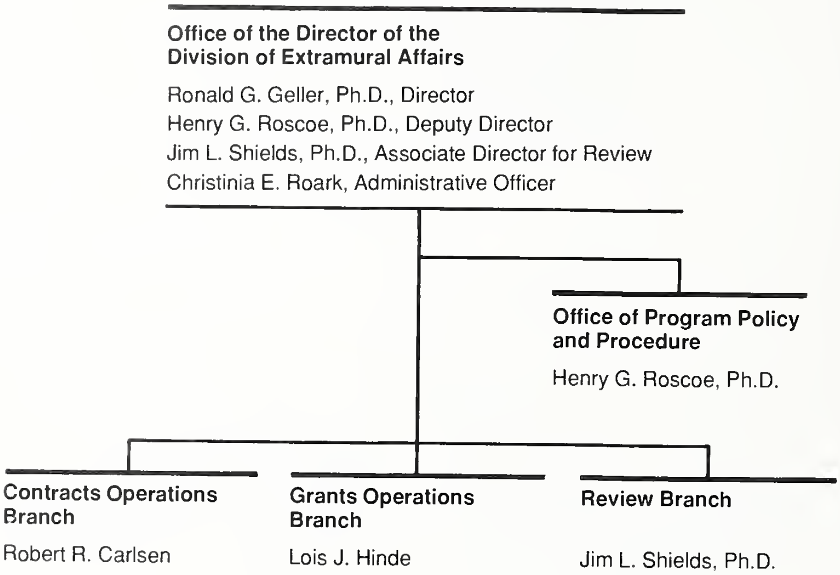
## Division of Extramural Affairs

The Division of Extramural Affairs (DEA) advises the Director, NHLBI, on research contract, grant, and research training program policies.

The Division represents the Institute on overall NIH committees on extramural program policy, oversees compliance with such policy within the NHLBI, and coordinates the Institute's research grant and research training and development programs with the National Heart, Lung, and Blood Advisory Council.

The Division provides grant and contract management and processing services to the Institute's program divisions.

The Division supplies initial scientific merit review of applications and proposals for project grants, program project and center grants, research training and development grants, cooperative agreements, and research contracts for the Institute.


Office of the Director of the Division of Extramural Affairs
Ronald G. Geller, Ph.D., Director
Henry G. Roscoe, Ph.D., Deputy Director
Jim L. Shields, Ph.D., Associate Director for Review
Christinia E. Roark, Administrative Officer
Office of Program Policy and Procedure
Henry G. Roscoe, Ph.D.
Contracts Operations Branch
Robert R. Carlsen
Grants Operations Branch
Lois J. Hinde
Review Branch
Jim L. Shields, Ph.D.

## Division of Intramural Research

The Division of Intramural Research (DIR) plans, conducts, and directs a program of basic laboratory and clinical research in heart, blood vessel, and lung diseases, certain blood diseases such as sickle cell anemia and hemophilia, and development of technology related to cardiovascular, pulmonary, and hematologic disorders.

The Division maintains communication with other programs of the Institute to facilitate early practical application of basic research findings. Areas of major interest include the biology of experimental and clinical arteriosclerosis and its manifestations; the pathophysiology of hypertensive vascular disease; functions of the lung; clinical and experimental studies on physiologic and pharmacologic aspects of heart, blood, and lung diseases; and a broad program of other basic research and technical developments.

**Office of the Director of the Division of Intramural Research**

Edward D. Korn, Ph.D., Director
Harry R. Keiser, M.D., Clinical Director
Arthur R. Nienhuis, M.D., Deputy Clinical Director
Hillel Soclof, Administrative Officer
Lila Edwards, Deputy Administrative Officer
Robert F. Hoyt, Jr., D.V.M., M.S., Chief, Section on Laboratory Animal Medicine and Surgery

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Stephen E. Epstein, M.D.

**Clinical Hematology Branch**

Arthur R. Nienhuis, M.D.

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**Molecular Disease Branch**

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**Molecular Hematology Branch**

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**Pathology Branch**

William C. Roberts, M.D.

**Pulmonary Branch**

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Marshall W. Nirenberg, Ph.D.

**Laboratory of Biochemistry**

Earl R. Stadtman, Ph.D.

**Laboratory of Biophysical Chemistry**

Henry M. Fales, Ph.D.

**Laboratory of Cardiac Energetics**

Robert Balaban, Ph.D.

**Laboratory of Cell Biology**

Edward D. Korn, Ph.D.

**Laboratory of Cellular Metabolism**

Martha Vaughan, M.D.

**Laboratory of Chemical Pharmacology**

James R. Gillette, Ph.D.

**Laboratory of Kidney and Electrolyte Metabolism**

Maurice B. Burg, M.D.

**Laboratory of Molecular Cardiology**

Robert S. Adelstein, M.D.

# 5. Disease Statistics

Cardiovascular, lung, and blood diseases represent a major health concern for the U.S. population. Clinical manifestations and deaths from them constitute a large morbidity, mortality, and economic burden on individuals, families, and the Nation. The more common forms are atherosclerosis, particularly coronary heart disease (heart attack) and cerebrovascular disease (stroke); hypertension; chronic obstructive pulmonary disease; asthma; and the blood-clotting disorders: embolisms and thromboses. Because many of the diseases begin early in life, their early detection and control can reduce the risk of disability and delay death.

Together, all cardiovascular, lung, and blood diseases accounted for 1,138,000 deaths in 1989, 53 percent of all deaths, and $202 billion in economic costs in 1988, 25 percent of the total economic costs of illness, injuries, and death. Heart disease is the leading cause of death, cerebrovascular disease is third (behind cancer), and chronic obstructive pulmonary disease ranks fifth (behind accidents). Cardiovascular, lung, and blood diseases account for 4 of the 10 leading causes of deaths, 5 of the 10 leading causes of infant deaths, and 5 of the 13 leading chronic conditions causing limitation of activity.

During the past 10 years (1979 to 1989), the age-adjusted death rate declined 22 percent for heart disease (30 percent for the major form, coronary heart disease) and 31 percent for stroke, but there was a 33 percent increase in mortality from chronic obstructive pulmonary disease. Improvement in mortality from cardiovascular and blood-clotting disorders has been extraordinarily great over the past 20 years in both young and older adults. This is reflected in the rapid increase in life expectancy. It is not known, however, if there has been concomitant improvement in morbidity and case fatality on a national scale.

### Cardiovascular Diseases

- Cardiovascular diseases caused nearly one of every two deaths, or 44 percent of all deaths, in 1989 (p. 33).
- Cardiovascular diseases caused 945,000 deaths in 1989; 73 percent of them due to atherosclerosis (pp. 33, 34).
- Heart disease is the leading cause of death; the main form is coronary heart disease, which caused 498,000 deaths in 1989 (pp. 34, 35).
- Heart disease accounts for the most years of potential life lost (p. 35).
- Cerebrovascular disease is the third leading cause of death. It caused 147,000 deaths in 1989 (pp. 34, 35).
- Heart disease and stroke are leading causes of death throughout life (p. 35).
- Heart disease, hypertension, and cerebrovascular disease rank among the leading chronic conditions causing limitation of activity (p. 37).
- About 61 million Americans have hypertension. It is a condition that is more common in blacks than in whites (p. 37).
- In 1989, the death rate for coronary heart disease was 51 percent of what it was in 1969, and cerebrovascular disease was 42 percent of what it was in 1969 (p. 38).
- Between 1969 and 1989, the combined death rate for all cardiovascular diseases declined by 45 percent. This decline is more than three times faster than the decline for all other causes of death combined (p. 38).
- Declines in death rates for cardiovascular diseases contributed to 79 percent of the decline in total mortality between 1969 and 1989 (p. 38).
- By 1989, heart disease was no longer the leading cause of death under age 75 (p. 39).
- In 1987, among 32 industrialized countries, the United States:

  —Ranked 18th in cardiovascular disease mortality in middle-aged men and 16th in women (p. 40).

  —Ranked 7th and 17th in men and women, respectively, for percent decline in mortality for cardiovascular diseases, 1977 to 1987 (p. 41).

- Because of the rapid decline in mortality from coronary heart disease since its peak in 1963, there were 472,000 fewer deaths from this cause in 1989 than would have occurred if there had been no decline (p. 43).
- The economic cost of cardiovascular diseases was an estimated $144 billion in 1988:

  —$73 billion in direct health expenditures.

  —$16 billion in indirect cost of morbidity.

  —$55 billion in indirect cost of mortality. (p. 45)

**Lung Diseases**

- Lung diseases, excluding lung cancer, caused an estimated 198,000 deaths in 1989 (p. 33).
- Chronic obstructive pulmonary disease (COPD) caused 79,000 deaths in 1989 and is the fifth leading cause of death (pp. 34, 35).
- Lung diseases account for 48 percent of all deaths under 1 year of age (p. 36).
- The first four leading causes of infant mortality are lung diseases or have a lung disease component; rates declined between 1979 and 1988:

  —Congenital anomalies (-18%).*

  —Sudden infant death syndrome (-7%).

  —Respiratory distress syndrome (-48%).

  —Disorders relating to short gestation (-16%). (p. 36)

- Asthma and emphysema are among the leading chronic conditions causing limitation of activity (p. 37).
- Among 31 industrialized countries, the United States ranked 14th for COPD mortality in men 35 to 74 years of age and 9th in women in that age group in 1987 (p. 42).
- Between 1979 and 1989, the death rate for COPD increased by 33 percent in contrast with declines for other major causes except lung cancer (p. 43); but the trend is downwards in men under age 75 and in women under age 45 (not shown).
- The economic cost of these lung diseases was an estimated $53 billion in 1987:

  —$26 billion in direct health expenditures.

  —$16 billion in indirect cost of morbidity.

  —$11 billion in indirect cost of mortality. (p. 45)

**Blood Diseases and Resources**

- An estimated 293,000 deaths, 14 percent of all deaths, were attributed to diseases of the blood in 1989. This includes:

  —285,000 due to blood clotting disorders.

  —6,000 due to diseases of the red blood cell.

  —2,000 due to bleeding disorders. (pp. 33, 34)

- A large proportion of the deaths from acute myocardial infarction and cerebrovascular disease involve blood clotting problems (p. 34).
- In 1987, blood clotting disorders cost the Nation's economy $37 billion, and other blood diseases cost $4 billion (p. 45).
- In 1987, 13 million units of blood were collected from almost 9 million donors (not shown).
- In 1987, approximately 20 million units of blood products were transfused to 4 million patients (not shown).

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*Congenital anomalies of the respiratory system increased 74%.

## Total Deaths and Deaths From Cardiovascular, Lung, and Blood Diseases, U.S., 1969 and 1989

| | 1969 | | 1989 | |
|---|---|---|---|---|
| **Cause of Death** | **Number of Deaths** | **Percent of Total** | **Number of Deaths** | **Percent of Total** |
| All Causes of Death | 1,922,000 | 100 | 2,155,000 | 100 |
| All Cardiovascular, Lung, and Blood Diseases | 1,182,000 | 62 | 1,138,000 | 53 |
| Cardiovascular Diseases (CVD) | 1,037,000 | 54 | 945,000 | 44 |
| Blood | 408,000* | 21 | 293,000‡ | 14 |
| Lung | 150,000† | 8 | 198,000† | 9 |
| All Other Causes of Death | 740,000 | 38 | 1,017,000 | 47 |

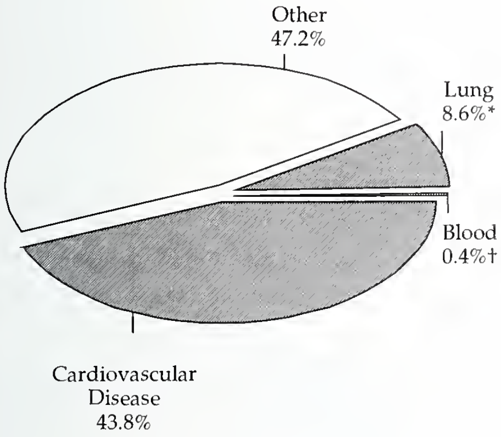
*Includes 408,000 CVD deaths involving blood clotting.

†Includes 12,000 CVD deaths due to pulmonary heart disease.

‡Includes 285,000 CVD deaths involving blood clotting, including 11,000 from pulmonary heart disease.

Source: Vital Statistics of the U.S., NCHS (Figures shown are estimated by NHLBI).

### Percent Distribution of Total Deaths by Major Causes, U.S., 1989

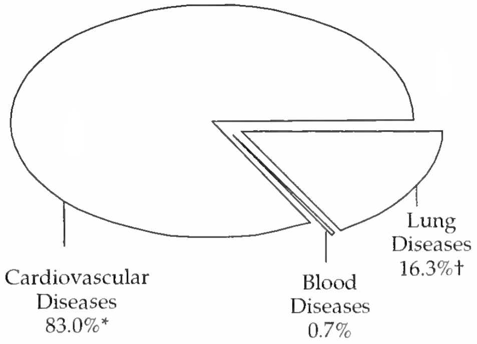


▨ Total Cardiovascular, Lung, and Blood Diseases 52.8%

*Excludes deaths from pulmonary heart disease (6.1%).

†Excludes deaths from blood clotting disorders and pulmonary embolism (13.2%).

### Percent Distribution of Cardiovascular, Lung, and Blood Disease Deaths, U.S., 1989



*Cardiovascular diseases involving blood clotting (30.2%).

†Pulmonary heart disease (1.4%) included with cardiovascular diseases.

## Estimated Number of Deaths From Specific Cardiovascular, Lung, and Blood Diseases, U.S., 1989

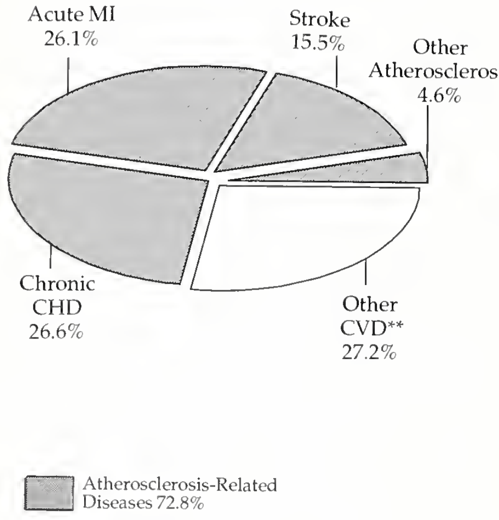
| Cause of Death | Deaths (thousands)<br>Cardiovascular | Lung | Blood |
|---|---|---|---|
| Acute Myocardial Infarction | 247 | — | 169* |
| Other Coronary Heart Disease | 251 | — | — |
| Cerebrovascular Diseases (Stroke) | 147 | — | 102* |
| Other Atherosclerosis | 43 | — | 3* |
| Pulmonary Embolism | 11 | 11* | 11* |
| Other Cardiovascular Diseases | 246 | 2* | — |
| Diseases of the Red Blood Cell | — | — | 6 |
| Bleeding Disorders | — | — | 2 |
| Chronic Obstructive Pulmonary Disease | — | 79 | — |
| Other Airways Diseases (Includes Asthma) | — | 6 | — |
| Pneumonia and Influenza | — | 76 | — |
| Neonatal Pulmonary Disorders | — | 16 | — |
| Interstitial Lung Diseases | — | 6 | — |
| Inhalation Diseases | — | 2 | — |
| Total | 945 | 198 | 293 |

*Deaths from clotting or pulmonary disorders also included as cardiovascular deaths.

Note: Total, excluding overlap, is 1,138,000.

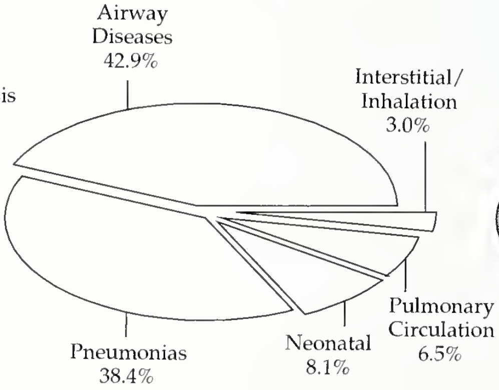
Source: Vital Statistics of the U.S., NCHS (figures shown were estimated by NHLBI).

## Percent Distribution of Deaths From Cardiovascular Diseases, U.S., 1989



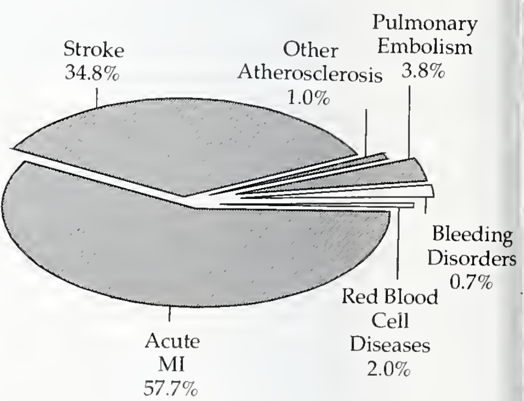
**Includes pulmonary embolism, cardiac failure, cardiac dysrhythmias, hypertensive disease, and other heart and blood vessel diseases.

## Percent Distribution of Deaths From Lung Diseases, U.S., 1989



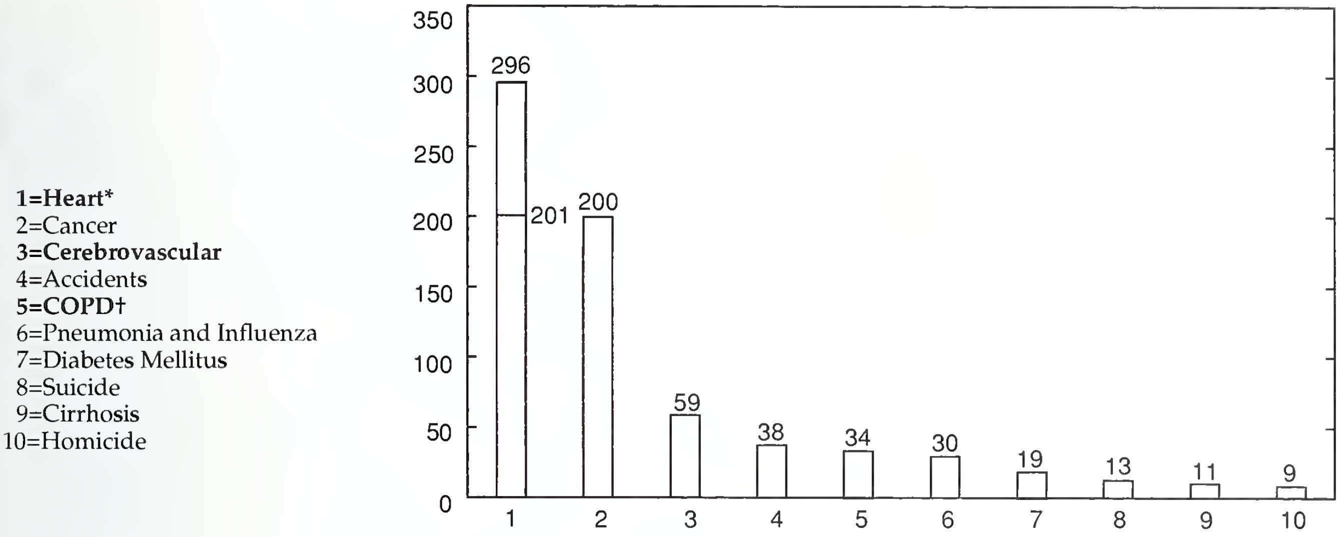
Note: MI = myocardial infarction, CHD = coronary heart disease, and CVD = cardiovascular disease.

## Percent Distribution of Deaths From Blood Diseases, U.S., 1989



Source: Vital Statistics of the U.S., NCHS (figures shown were estimated by NHLBI).

## 10 Leading Causes of Death: Death Rates, U.S., 1989 (Rates per 100,000 Population)



| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Years of potential life lost (millions)‡ | 8.5 | 7.7 | 1.5 | 3.4 | 1.0 | 0.8 | 0.6 | 1.1 | 0.6 | 1.0 |

*Includes 201 deaths per 100,000 population from coronary heart disease.

†Chronic obstructive pulmonary diseases and allied conditions (including asthma).

‡Based on the average remaining years of life.

Note: Bold type indicates diseases addressed in Institute programs.

Source: Vital Statistics of the U.S., NCHS (provisional).

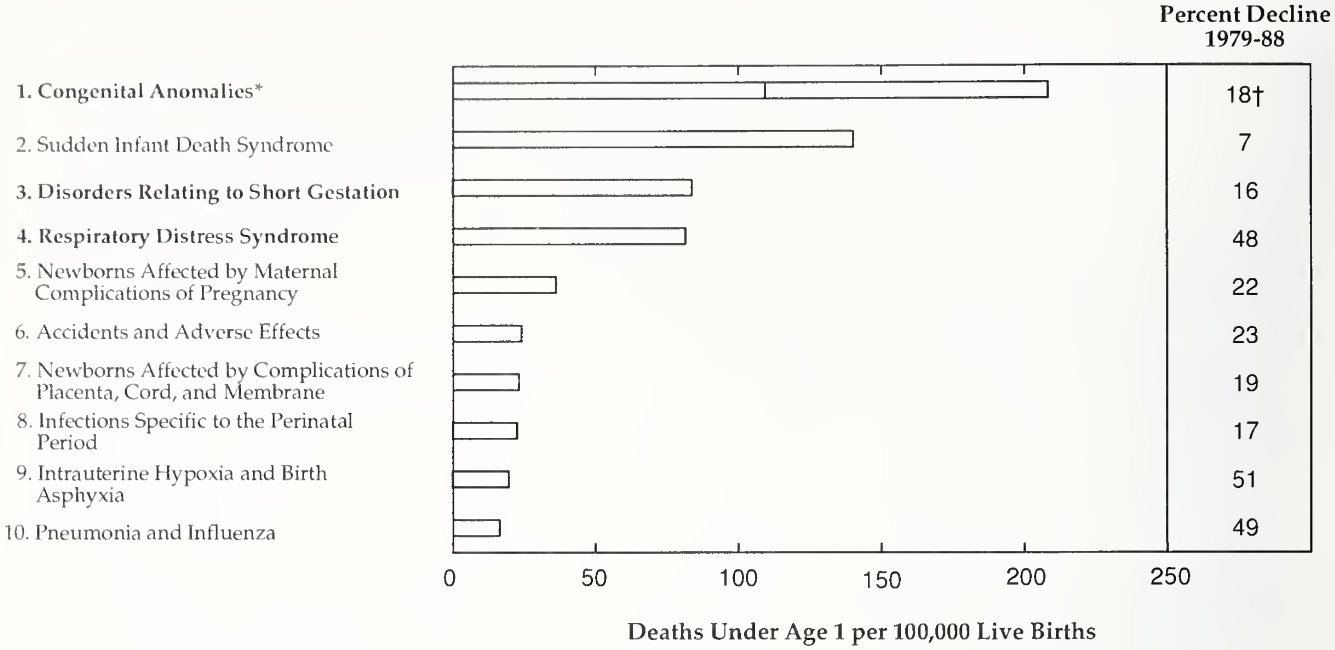
## 10 Leading Causes of Death by Age, U.S., 1989 (Rank From Highest = 1)

| | Age Group | | | | |
|---|---|---|---|---|---|
| **Cause of Death** | **1-24** | **25-44** | **45-64** | **65-84** | **85+** |
| **Heart Disease** | **6** | **4** | **2** | **1** | **1** |
| Malignant Neoplasms (Cancer) | 4 | 2 | 1 | 2 | 3 |
| **Cerebrovascular Diseases** | **10** | **8** | **3** | **3** | **2** |
| Accidents | 1 | 1 | 4 | 7 | 7 |
| **Chronic Obstructive Pulmonary Disease (COPD)** | **9** | — | **5** | **4** | **5** |
| Pneumonia/Influenza | 8 | 10 | 9 | 5 | 4 |
| Diabetes | — | 9 | 7 | 6 | 8 |
| Suicide | 3 | 5 | 8 | — | — |
| Cirrhosis | — | 7 | 6 | 9 | — |
| **Atherosclerosis** | — | — | — | — | **6** |
| Nephritis | — | — | — | 8 | 9 |
| Homicide | 2 | 6 | — | — | — |
| Septicemia | — | — | — | 10 | 10 |
| Congenital Anomalies | 5 | — | — | — | — |
| HIV Infection | 7 | 3 | 10 | — | — |

Note: Bold type indicates diseases addressed in Institute progams.

Source: Vital Statistics of the U.S., NCHS (provisional).

## 10 Leading Causes of Infant Mortality, U.S., 1988



*Congenital cardiovascular diseases and congenital anomalies of the respiratory system represented 109.3 of 208.2 deaths due to congenital anomalies.

†Congenital cardiovascular diseases declined 24%; congenital anomalies of the respiratory system increased 74%; other congenital anomalies declined 34%.

Note: Bold type indicates diseases addressed in Institute programs.

Source: Vital Statistics of the U.S., NCHS.

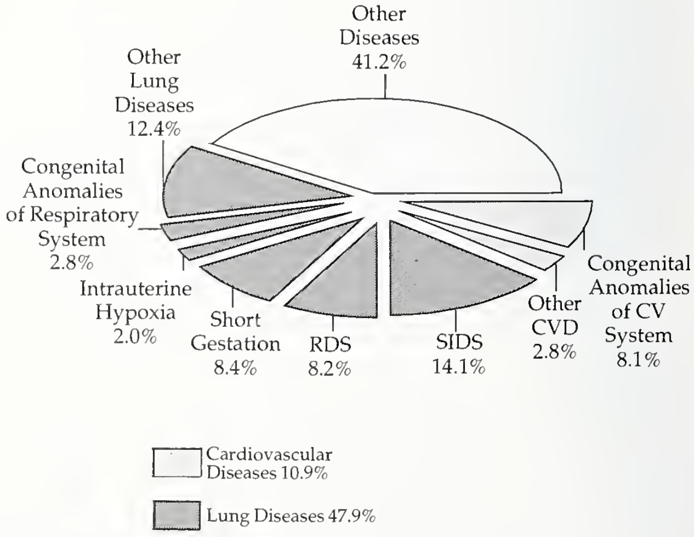
## Percent of All Deaths Under Age 1 Due to Cardiovascular and Lung Diseases, U.S., 1988

| Cause of Death | Deaths Under Age 1 |
|---|---|
| All Causes | 38,910 |
| Cardiovascular Diseases | 4,236 |
| Congenital Anomalies | 3,166* |
| Other | 1,070* |
| Lung Diseases | 18,628 |
| Sudden Infant Death Syndrome (SIDS) | 5,476 |
| Respiratory Distress Syndrome (RDS) | 3,181* |
| Short Gestation | 3,268* |
| Intrauterine Hypoxia | 777 |
| Congenital Anomalies | 1,109* |
| Other Lung Diseases | 4,817† |
| Other Diseases | 16,046 |

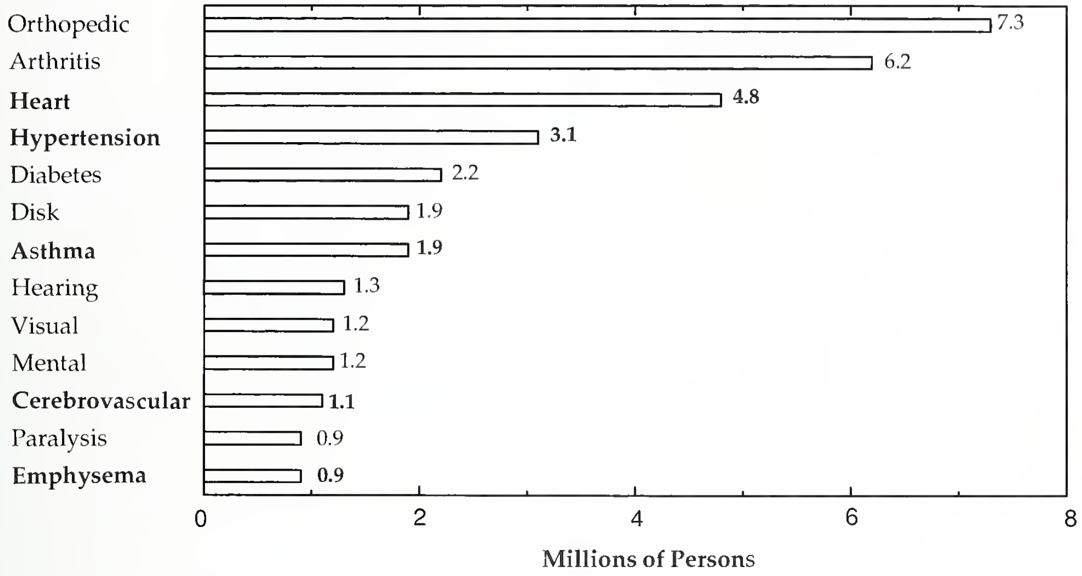
*NHLBI programs address these diseases.

†NHLBI programs address diseases that cause 1,229 of these deaths.

Source: Vital Statistics of the U.S., NCHS.

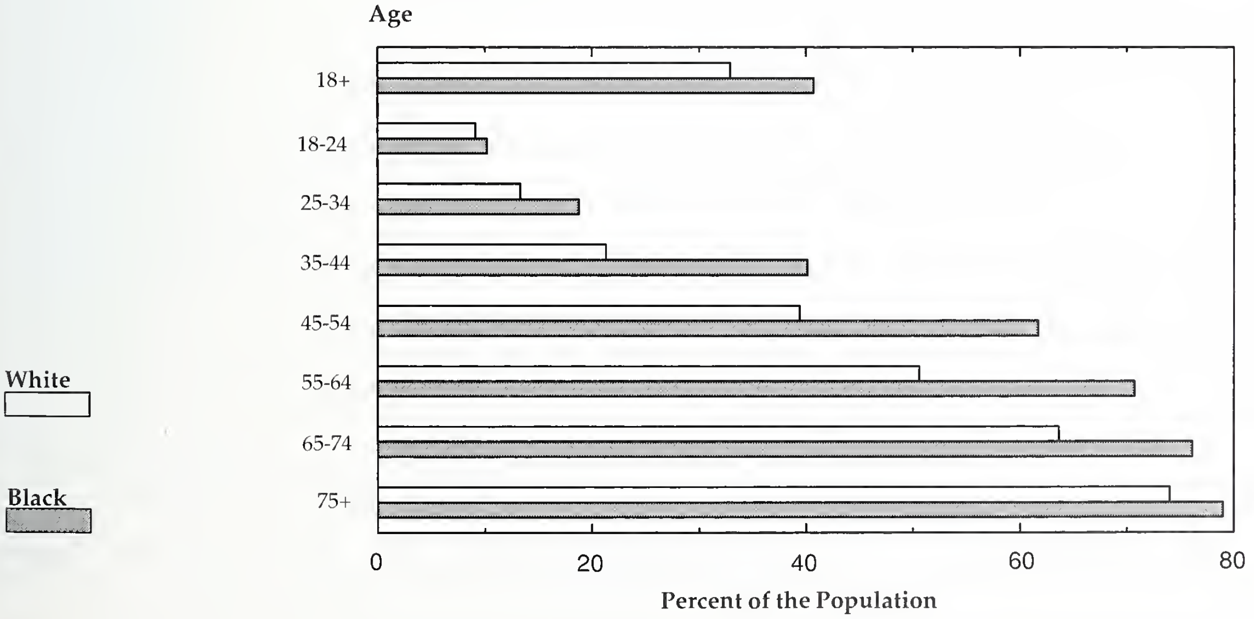


## Prevalence of Leading Chronic Conditions Causing Limitation of Activity, U.S., 1986-1988



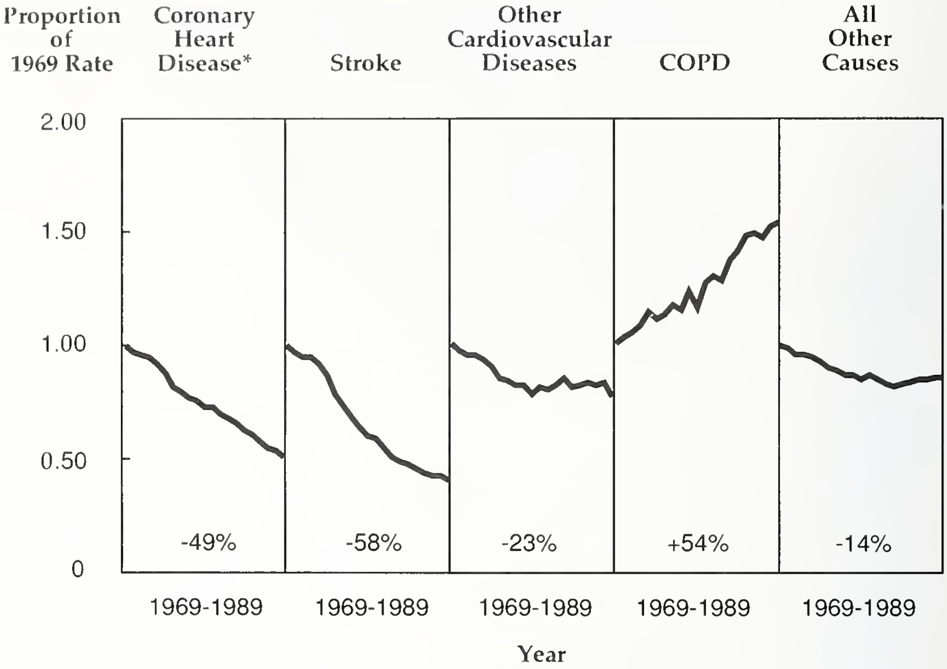
Note: Bold type indicates diseases addressed in Institute programs.
Source: Health Interview Survey, NCHS.

## Percent of the Adult Population With Hypertension,* by Age and Race, U.S., 1976-1980



*Systolic blood pressure 140+ or diastolic 90+ or taking antihypertensive medication.
Source: NHLBI tabulation of data from NHANES II, NCHS.

## 20-Year Trends in Age-Adjusted Death Rates, U.S., 1969-1989 (Expressed as a Proportion of the Rate in 1969)



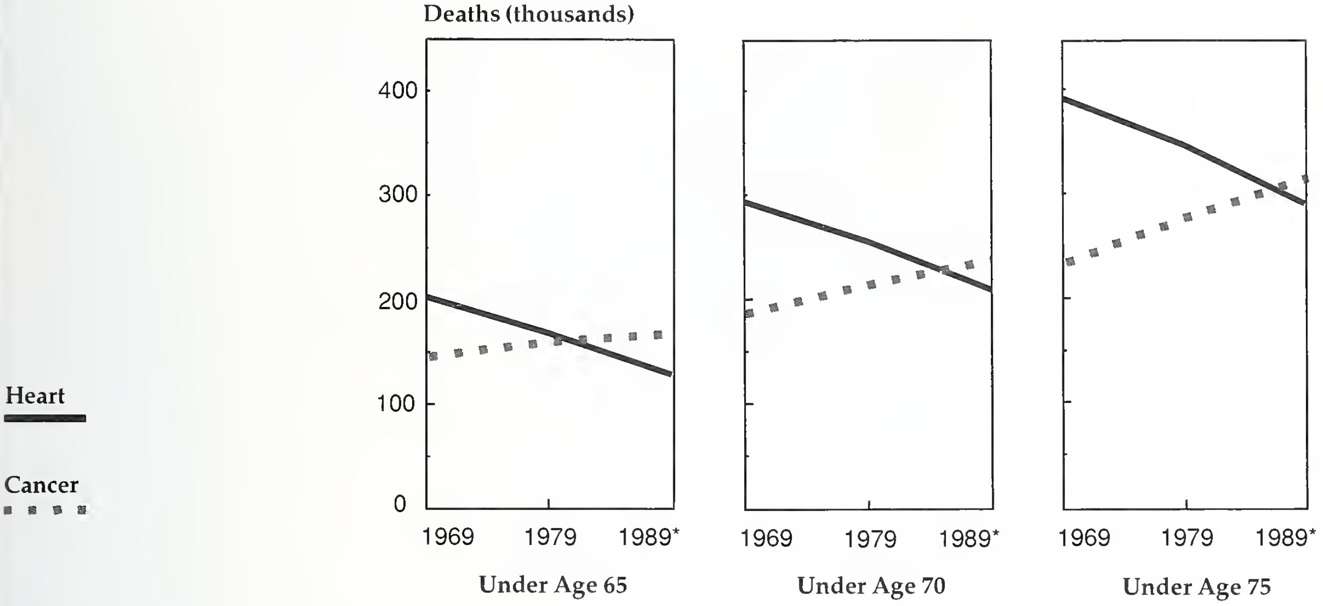
*Comparability ratios applied to rates for 1968-1978.
Note: Data for 1989 are provisional.
Source: Vital Statistics of the U.S., NCHS.

## Death Rate for All Causes, 1969 and 1989, and Percent Contribution to the Decline by Declines for CVD and Non-CVD*

| Cause | Rate 1969 | Rate 1989† | Rate Decline | Percent Decline | Percent Contribution to Total Decline |
|---|---|---|---|---|---|
| All | 729 | 524 | 205 | 28 | 100 |
| CVD | 357 | 196 | 161 | 45 | 79 |
| CHD | 206 | 105 | 101 | 49 | 49 |
| Stroke | 68 | 28 | 40 | 58 | 20 |
| Other | 83 | 63 | 20 | 24 | 9 |
| Non-CVD | 372 | 328 | 44 | 12 | 22 |

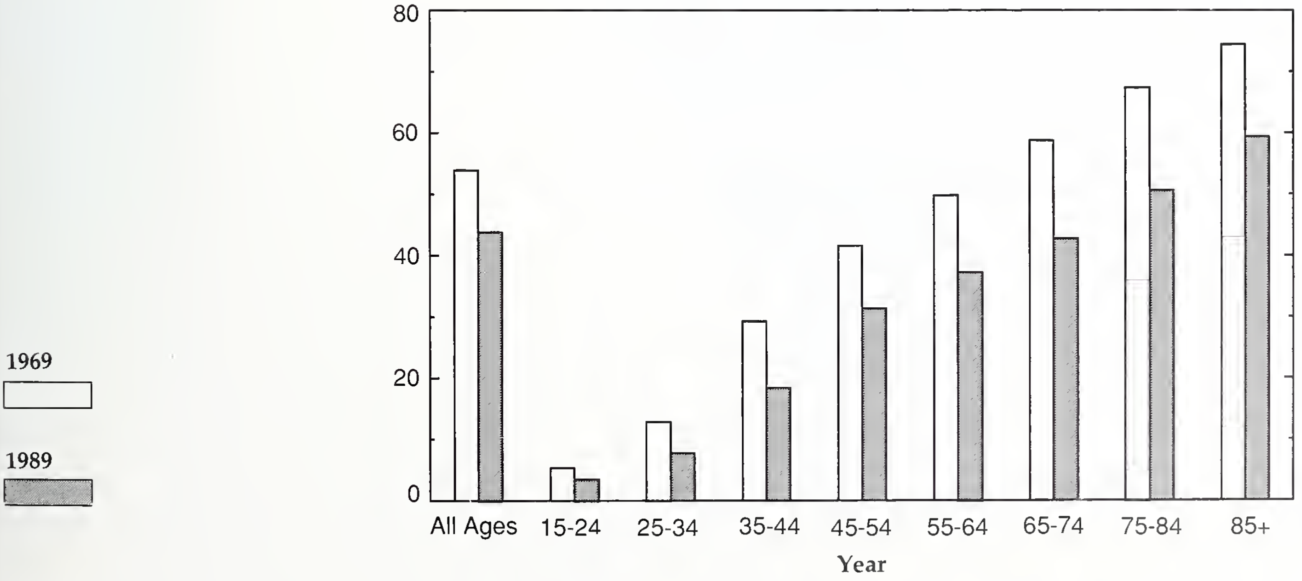
*Age-adjusted rate per 100,000 population, all causes combined.
†Provisional.
Notes: CVD means cardiovascular disease; CHD means coronary heart disease; numbers may not add to totals due to rounding.
Source: Vital Statistics of the U.S., NCHS.

## Number of Deaths Under a Specified Age From Heart Disease and Cancer, U.S., 1969, 1979, and 1989



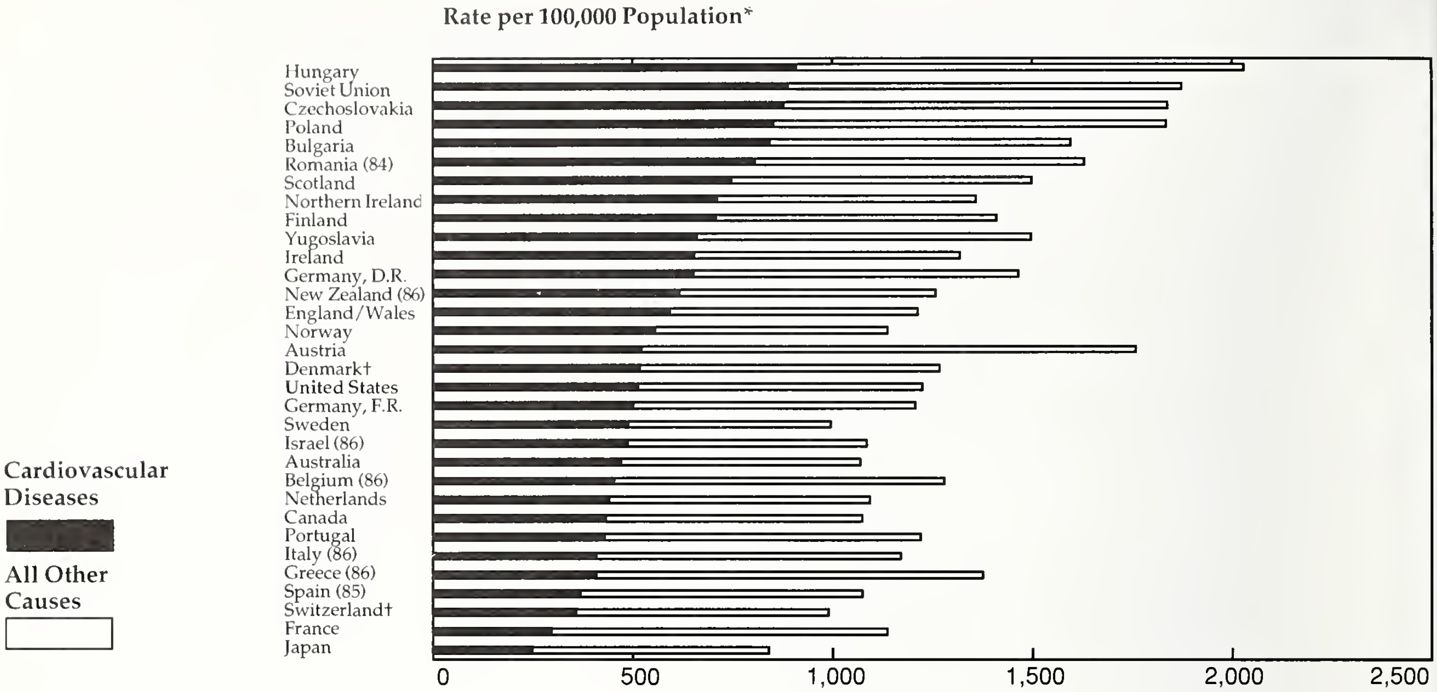
*Estimated by NHLBI.

## Percent of Deaths Due to Cardiovascular Disease by Age, U.S., 1969 and 1989

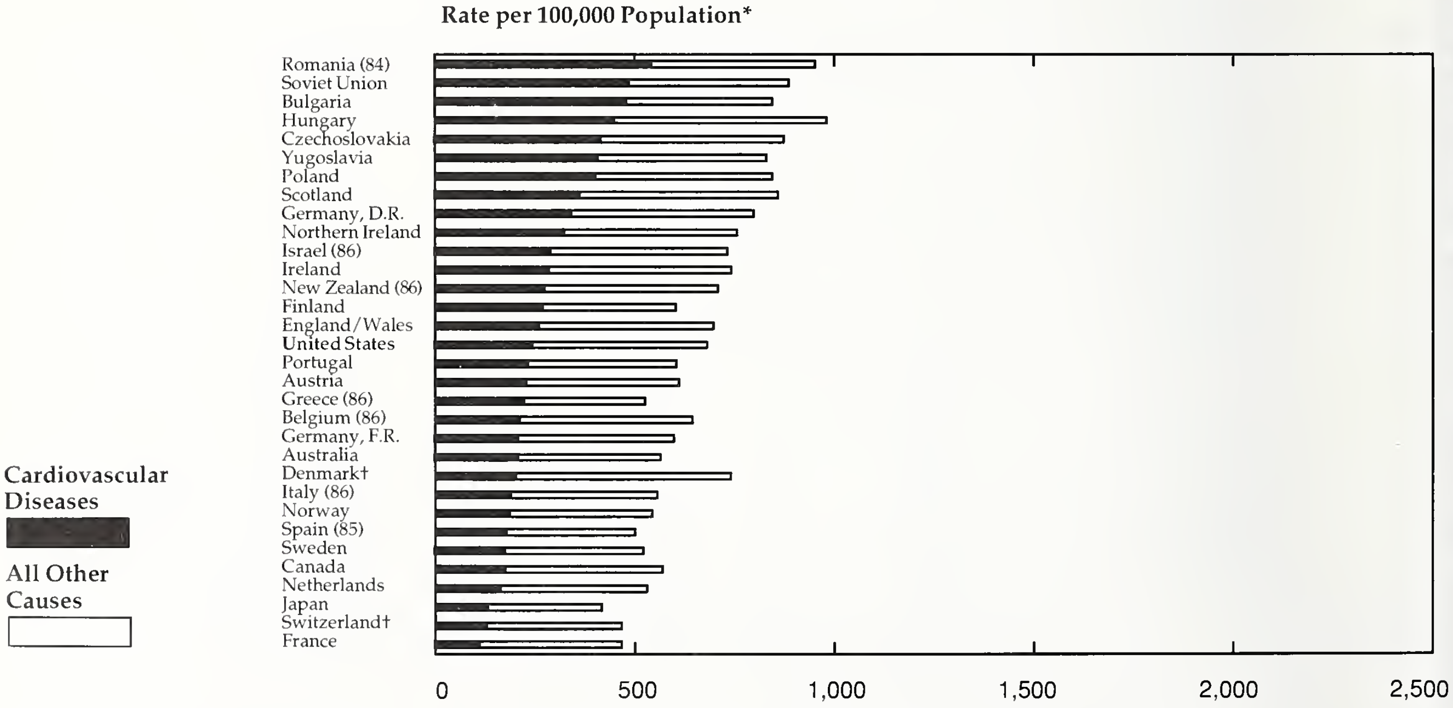


Source: Vital Statistics of the U.S., NCHS. Data for 1989 estimated by NHLBI.

## Death Rate for All Causes and Cardiovascular Diseases, Men 35-74 in Selected Countries, 1987



## Death Rate for All Causes and Cardiovascular Diseases, Women 35-74 in Selected Countries, 1987

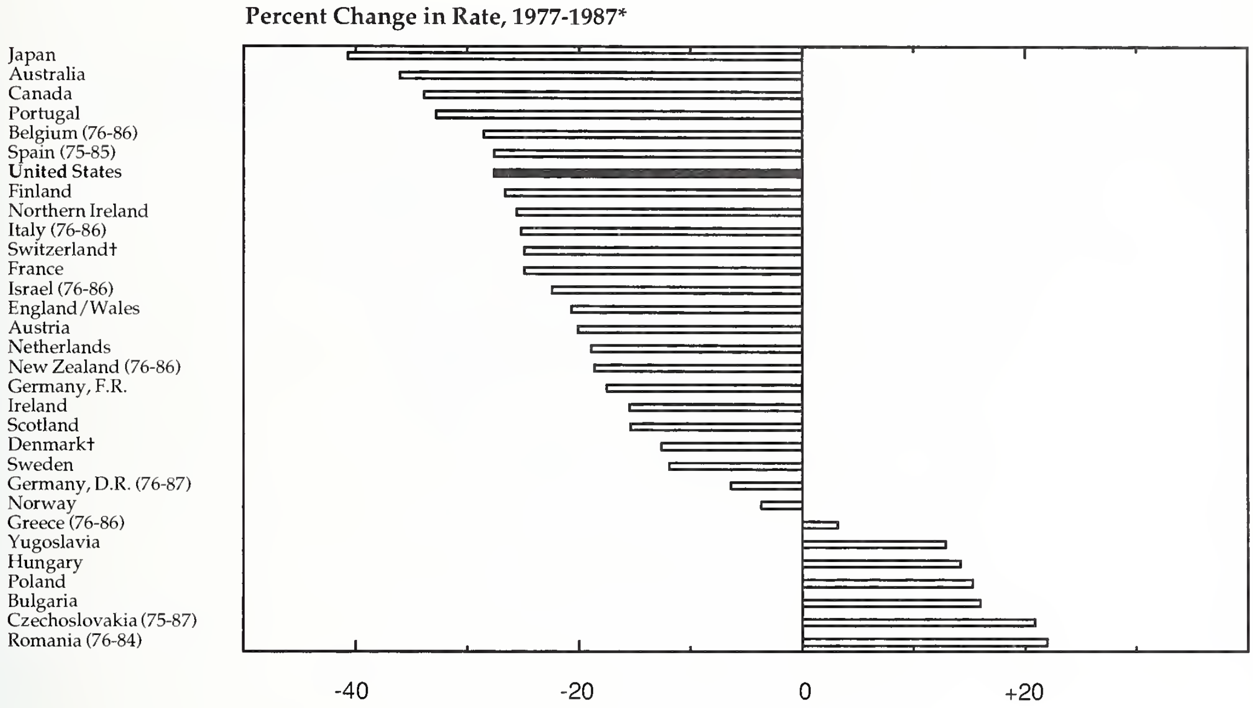


*ICD/9 390-459 for cardiovascular disease except as noted. Rates are adjusted to the European standard population.

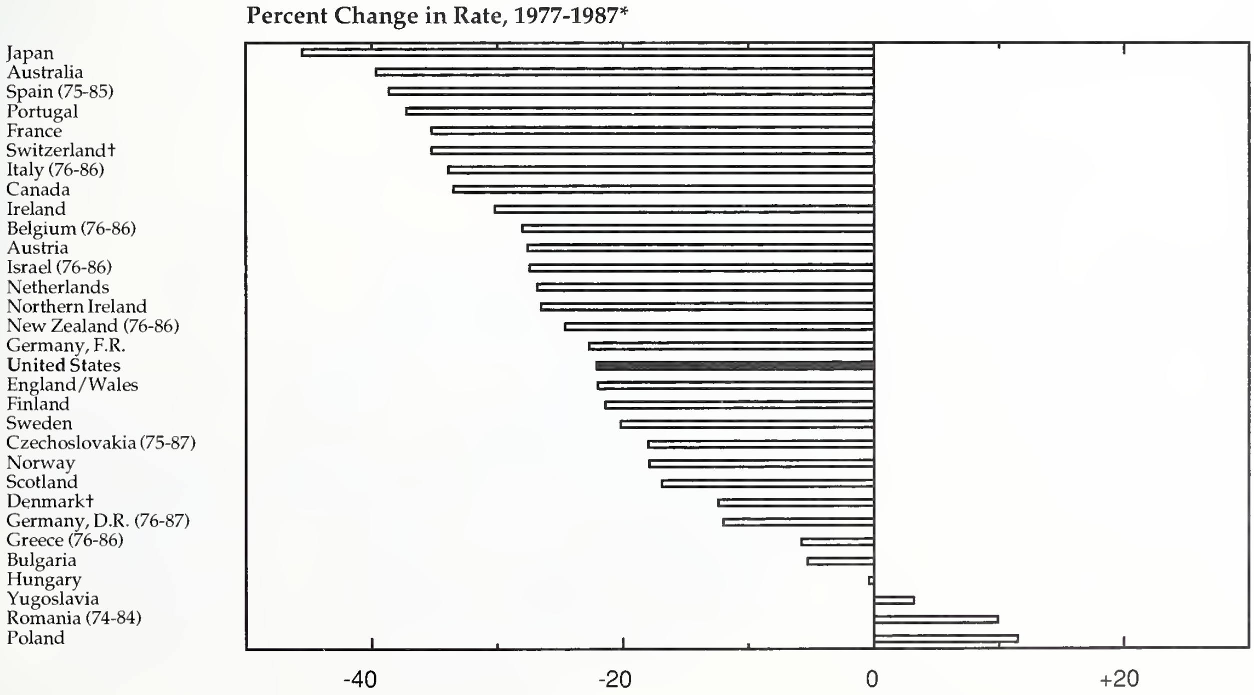
†ICD/8 390-458 for cardiovascular disease.

Source: World Health Organization.

## Percent Change in the Death Rate for Cardiovascular Disease, Men 35-74 in Selected Countries, 1977-1987



## Percent Change in the Death Rate for Cardiovascular Disease, Women 35-74 in Selected Countries, 1977-1987

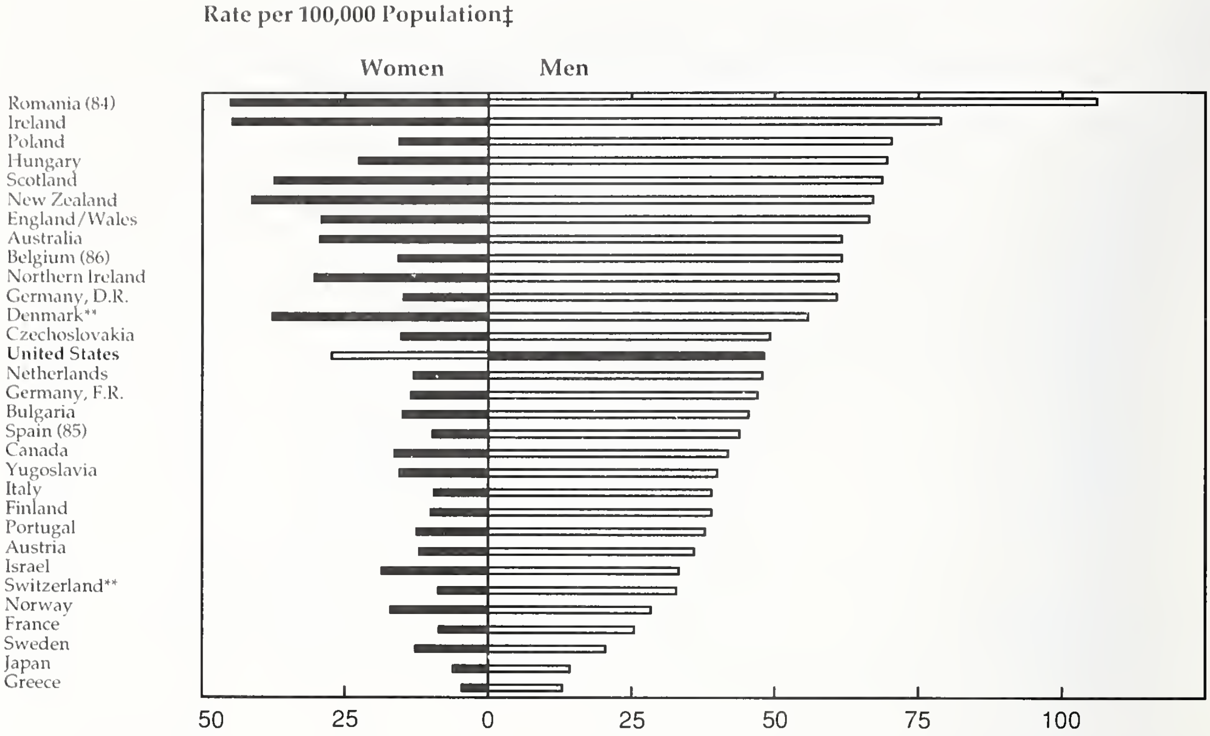


*Based on rates age-adjusted to the European standard population. Year range may vary as indicated.

†Eighth Revision of ICD for both years.

Source: World Health Organization.

## Death Rates for Chronic Obstructive Pulmonary Disease and Allied Conditions* By Sex, Ages 35-74, by Country, 1987†



*ICD/9 codes 490-496 except as noted.

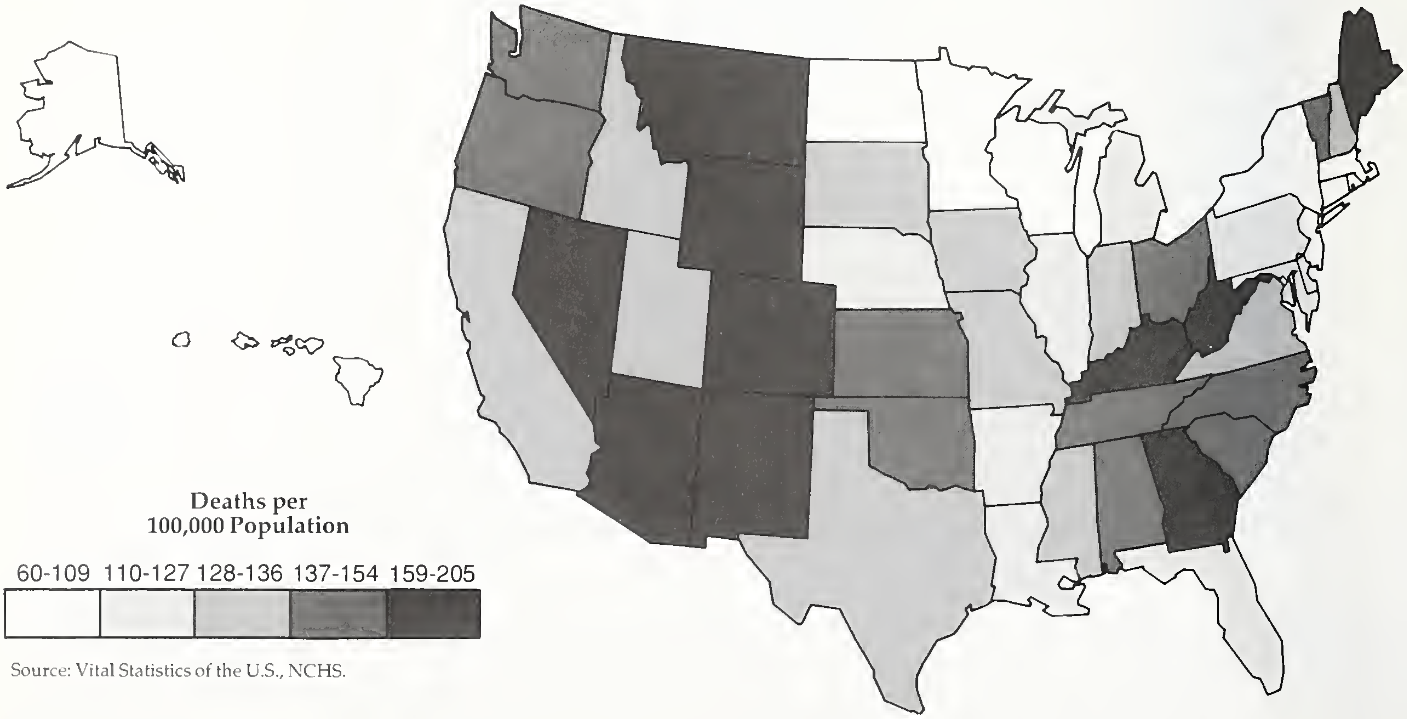
†Year may vary as indicated.

‡Rates are age-adjusted to the European standard population.

**ICD/8 codes 490-493.

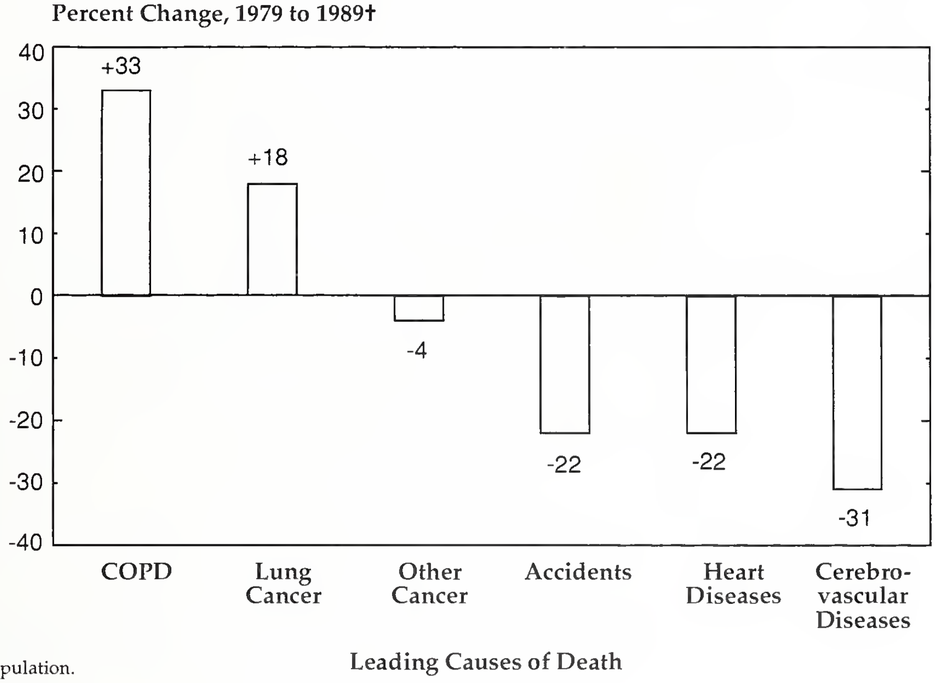
Source: Published and unpublished data from the World Health Organization.

## Age-Adjusted Mortality Rates by State, 1979-1981: Chronic Obstructive Pulmonary Disease, White Males, Ages 55-74



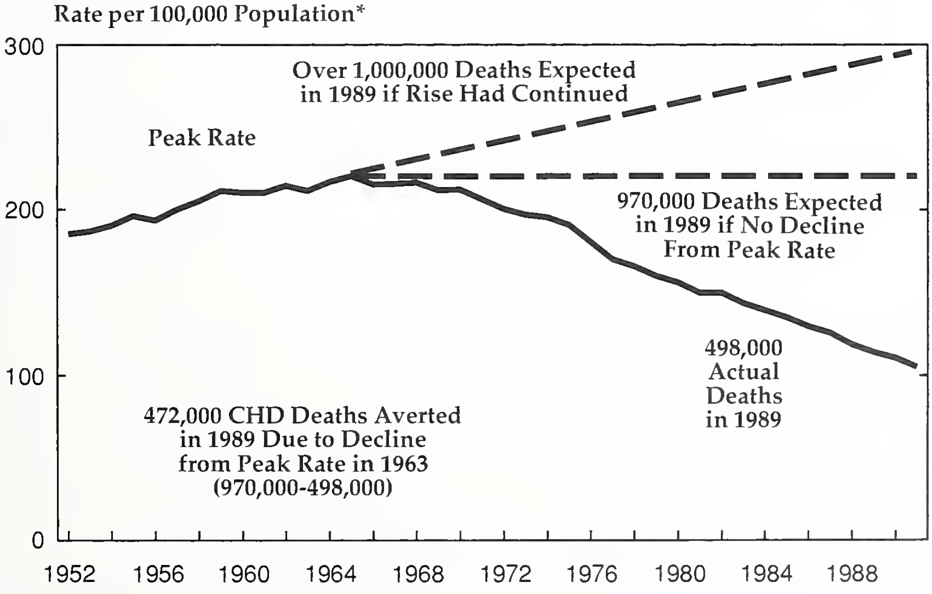
Source: Vital Statistics of the U.S., NCHS.

## Percent Change in Death Rates* for Leading Causes of Death, U.S., 1979-1989



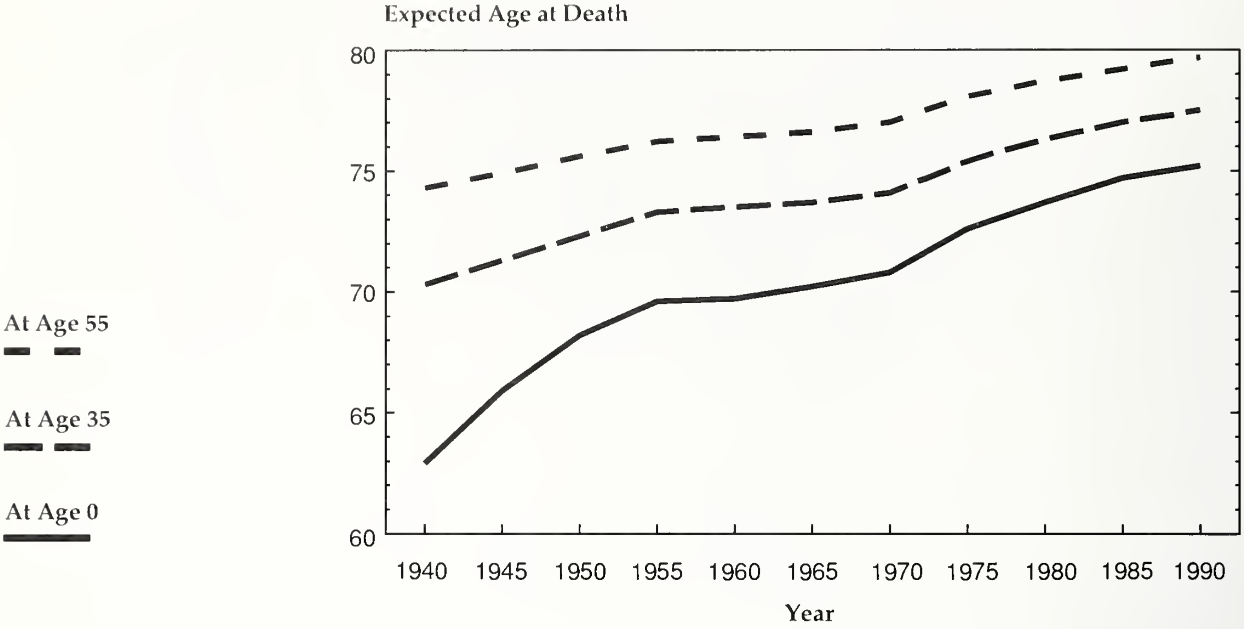
*Age-adjusted to the 1940 U.S. population.
†Provisional for 1989.
Source: Vital Statistics of the U.S., NCHS.

## Mortality Trend for Coronary Heart Disease, U.S., 1950-1989



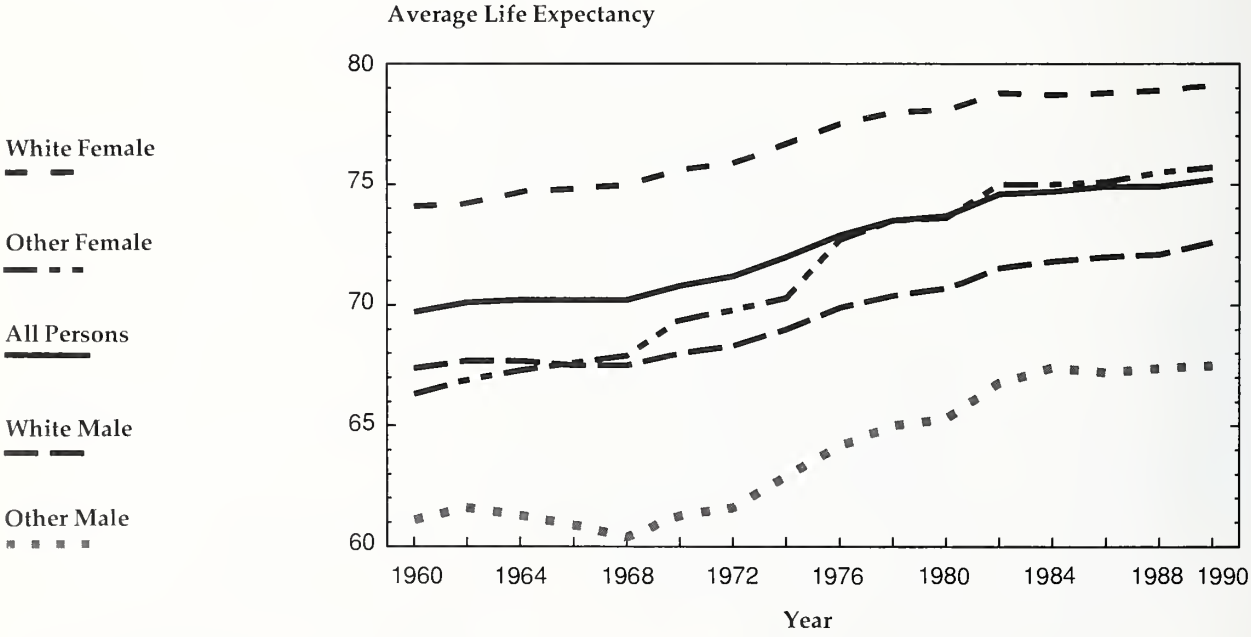
*Age-adjusted to U.S. population, 1940. (Comparability ratio applied to 1968-1978 rates.)
Source: Vital Statistics of the U.S., NCHS.

## Expected Age at Death for Persons Age 0, Age 35, and Age 55, for Total Population, U.S., 1940-1989*



*Provisional for 1989.
Source: Vital Statistics of the U.S., NCHS.

## Life Expectancy at Birth, U.S., 1960-1989*



*Provisional for 1989.
Source: Vital Statistics of the U.S., NCHS.

## Direct and Indirect Economic Costs of Illness by Major Diagnosis, U.S., 1988

| Diagnosis | Amount ($ in Billions) | | | | Percent Distribution | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Indirect Costs | | | | Indirect Costs | |
| | Total | Direct Costs* | Morbidity† | Mortality‡ | Total | Direct Costs | Morbidity | Mortality |
| *Cardiovascular Diseases§* | *144.4* | *73.0* | *15.8* | *55.6* | *17.8* | *15.0* | *14.9* | *25.5* |
| *(Involving Blood Clotting)*** | *(37.5)* | *(18.0)* | *(4.3)* | *(15.2)* | *(4.6)* | *(3.7)* | *(4.1)* | *(7.0)* |
| *Lung Diseases††* | *53.1* | *25.5* | *16.3* | *11.3* | *6.6* | *5.2* | *15.4* | *5.2* |
| *Blood Diseases††* | *4.4* | *3.2* | *0.4* | *0.8* | *0.5* | *0.7* | *0.4* | *0.4* |
| *Subtotal* | *$201.9* | *$101.7* | *$32.5* | *$67.7* | *24.9%* | *20.9%* | *30.8%* | *31.0%* |
| Diseases of the Digestive System | 78.3 | 60.3 | 8.5 | 9.5 | 9.7 | 12.4 | 8.0 | 4.4 |
| Neoplasms | 77.2 | 25.5 | 3.8 | 47.9 | 9.5 | 5.2 | 3.6 | 21.9 |
| Mental Disorders | 45.6 | 37.0 | 5.5 | 3.1 | 5.6 | 7.6 | 5.2 | 1.4 |
| Diseases of the Nervous System | 35.4 | 28.2 | 3.6 | 3.6 | 4.4 | 5.8 | 3.4 | 1.7 |
| Diseases of the Musculoskeletal System | 38.5 | 25.7 | 12.1 | 0.7 | 4.8 | 5.3 | 11.4 | 0.3 |
| Diseases of the Genitourinary System | 29.9 | 23.8 | 4.0 | 2.1 | 3.7 | 4.9 | 3.8 | 1.0 |
| Endocrine, Nutritional, and Metabolic Diseases | 24.8 | 16.5 | 3.2 | 5.1 | 3.1 | 3.4 | 3.0 | 2.3 |
| Infective and Parasitic Diseases | 28.7 | 12.6 | 3.8 | 12.3 | 3.5 | 2.6 | 3.6 | 5.6 |
| Diseases of the Skin | 15.7 | 14.1 | 1.4 | 0.2 | 1.9 | 2.9 | 1.3 | 0.1 |
| Other Respiratory Diseases | 30.8 | 20.1 | 9.1 | 1.6 | 3.8 | 4.1 | 8.6 | 0.7 |
| Other and Unallocable | 203.8 | 121.0 | 18.3 | 64.5 | 25.1 | 24.9 | 17.2 | 29.6 |
| Total | **$810.6** | **$486.5** | **$105.8** | **$218.3** | 100.0% | 100.0% | 100.0% | 100.0% |

*Personal health care expenditures for hospital care, nursing home care, drugs, and physician and other professional services. Totals reported by HCFA are allocated to disease groups according to hospital days, physician office visits (for drugs and physician and other professional care), and nursing home days based on the National Hospital Discharge Survey, the National Ambulatory Medical Care Survey, and the National Nursing Home Survey of NCHS.

†Estimate by NCHS for 1980 ($67.8 billion) increased by 1.56 reflecting the 1980-88 increase in mean earnings reported by the Bureau of the Census.

‡Deaths by age and sex, 1988, by cause applied to estimate present value of lifetime earnings in 1985 (discounted at 6%) increased by 1.14 to reflect the 1985-88 increase in mean earnings reported by the Bureau of the Census.

§Includes congenital cardiovascular diseases.

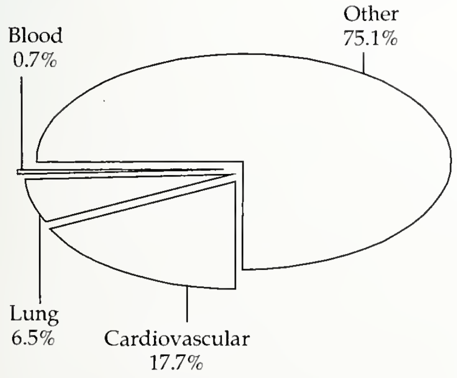
**Based on NHLBI definition of blood clotting diseases based primarily on proportions of morbidity and mortality statistics for acute myocardial infarction, cerebrovascular diseases, and diseases of arteries.

††Does not include lung cancer, leukemias, or pulmonary heart disease.

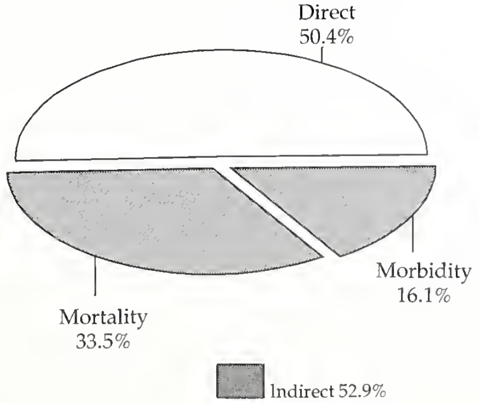
Note: Numbers may not add to 100% due to rounding.

Source: Estimated by NHLBI; data from NCHS, HCFA, Bureau of the Census.

### Total Economic Costs (Percent)



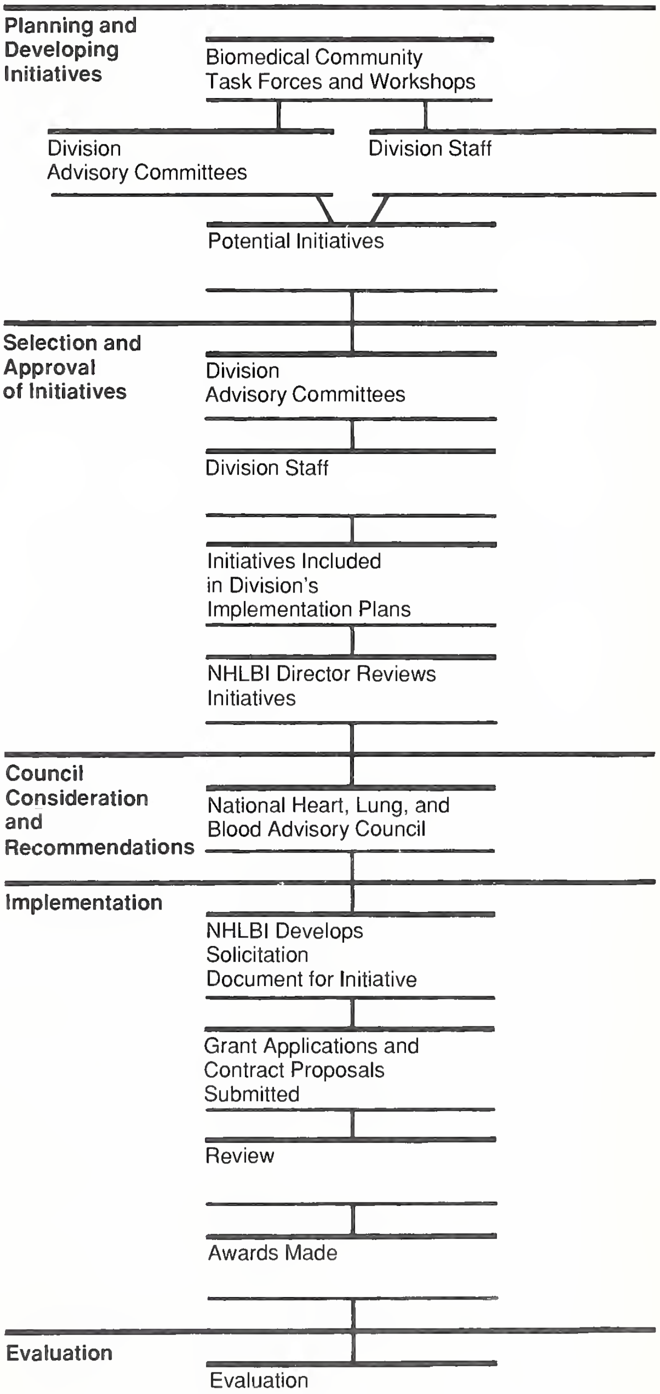
### Economic Costs: Cardiovascular, Lung, and Blood Diseases (Percent)



# 6. Process of Planning, Developing, and Implementing Initiatives

The National Heart, Lung, and Blood Institute provides leadership for a national program in diseases of the heart, blood vessels, lungs, and blood, and in the uses and management of blood resources. It is a task of considerable magnitude to ensure the continuing responsiveness of the Institute to evolving national needs, to corresponding changes in congressional mandates, and to the state of the science. Furthermore, since mandates normally are broadly stated and have widespread implications, programs developed to fulfill mandates vary in scope and direction.

The complex process of program planning, development, and implementation requires the availability and optimum utilization of scientific knowledge and of resources. The rapidity with which a specific mandate or approved initiative is implemented in a research program depends to a large degree on the availability of resources. Implementation of the Institute's programs is possible only through careful planning, coordination of resources, conscientious program management, and the interest and collaboration of dedicated experts in the scientific community (see figure).


Planning and Developing Initiatives
Biomedical Community Task Forces and Workshops
Division Advisory Committees
Division Staff
Potential Initiatives
Selection and Approval of Initiatives
Division Advisory Committees
Division Staff
Initiatives Included in Division's Implementation Plans
NHLBI Director Reviews Initiatives
Council Consideration and Recommendations
National Heart, Lung, and Blood Advisory Council
Implementation
NHLBI Develops Solicitation Document for Initiative
Grant Applications and Contract Proposals Submitted
Review
Awards Made
Evaluation
Evaluation

## Planning and Developing Initiatives

Each year, the NHLBI reviews and assesses the goals, objectives, and achievements of its National Program, and, in consultation with its six Advisory Committees and National Advisory Council, develops initiatives to address scientific needs and opportunities. Initiatives are developed from a variety of sources, including task forces, public briefings, Institute staff, interagency groups, workshops, technical working groups, seminars, and scientific consensus meetings, in combination with deliberations of the members of the Advisory Committees and of the National Advisory Council.

### Identifying Needs and Opportunities

Progress of the National Program is assessed against the state of the science as reflected in published scientific literature and the collective knowledge of participating scientific experts. Areas of need and opportunity are identified regularly for all programs. Existing research strategies are examined critically and considered for continuation, revision, expansion, or completion. New strategies are developed for emerging topic areas.

Areas of need and opportunity receive extensive review by Advisory Committee members, consultants, and program staff. In-depth discussions are held in working group sessions where advice from expert ad hoc members is obtained. If areas of interest are relevant to more than one NHLBI Division or NIH Institute, they are identified for joint development.

On the advice and recommendations of the Advisory Committee members, Division staff members develop the highest priority areas into proposed initiatives. Staff members also occasionally develop initiatives to take advantage of a particularly significant scientific need or opportunity.

## Criteria for Undertaking Initiatives

Factors that contribute to program and initiatives planning include the magnitude of a problem; the state of science, medical practice, and public health; the anticipated results that may provide entirely new concepts and approaches, significantly advance knowledge, or definitively settle an important question; the likelihood of achieving those results; timing; and resource needs and the alternate uses of those resources.

Initiatives are considered and justified primarily on the basis of the importance of their goals and the need for the Institute to solicit an activity through a request for applications or proposals rather than to announce its interest through a program announcement.

### The Importance of Goals

An initiative must compete in importance and for funds not only with other initiatives but also with other Institute programs, including investigator-initiated research. This "opportunity cost" is recognized.

Goals for initiatives can be of different types. Generally, their importance is determined by the anticipated direct results of the solicited program—the results of bringing new scientists, new disciplines, new approaches, and adequate resources to a promising but relatively little studied area; accelerating activity and capitalizing upon an opportunity in an especially important area; establishing a collaborative approach to a problem; or announcing specific goals and needs of the Institute. The basis of need for other initiatives is their anticipated long-term result. Some initiatives support other Institute activities—for example, providing animal resources or fabricating devices, assessing a target population through a survey, or developing a specific test methodology. Occasionally, an initiative is required to carry out a congressionally mandated activity.

### The Need for a Solicitation

There also must be one or more clear reasons for the Institute to issue a solicitation rather than rely upon a program announcement or investigator-initiated grant applications. Possible reasons include the anticipated inadequacy of a program announcement for eliciting sufficient or appropriate responses, or the specificity of Institute needs, which may be more detailed than is appropriate for a program announcement. There also may be a need for the Institute to coordinate or provide leadership in fostering interchange of ideas, developments, and data or in developing a collaborative protocol and maintaining adherence to it. A solicitation may be necessary to ensure comparable scientific or programmatic review of all responses.

### Other Factors

A host of other factors must also be considered, ranging from the importance of the Institute's serving as the funding agency, to the availability of resources, issues of program balance, and numerous logistical factors.

### Selection and Approval of Initiatives

Advisory Committees evaluate all suggested initiatives in their respective program areas with regard to scientific merit, timeliness, relevance to the National Plan, feasibility, and cost. Initiatives may be revised on the advice of the committees. Each Advisory Committee then places its initiatives into priority groupings or sequence.

Each categorical NHLBI Division evaluates the recommendations of its Advisory Committees in terms of the Division's objectives and resources. The initiatives are then incorporated into the Division's Implementation Plan. Initiatives for research that are of interest to other NHLBI Divisions or NIH Institutes are developed jointly and included in the Division's plan. Implementation plans are developed on a biennial basis, where possible, to provide for long-range planning and to project research needs and opportunities beyond the next fiscal year.

Division initiatives are presented to the Institute Director for discussion and review with reference to total available resources, congressional mandates, science that is of interest to more than one Division, and overall Institute needs.

### Council Consideration and Recommendations

To provide maximum flexibility to the Institute in implementing research initiatives, the Advisory Council considers initiatives at each of its meetings. Each proposed initiative is discussed first by members of the Council Working Group on Program. The initiatives are then presented at the Advisory Council meeting during open session. Council comments are solicited for each initiative, and Council advice on special areas of emphasis is encouraged.

### Post-Council Action: Program Implementation

Council comments are considered further by NHLBI staff and, on occasion, by other advisors to determine the appropriate course of action. When an initiative has been reviewed by the Council, it is considered for issuance by the Director, NHLBI. Initiatives may or may not be approved for release, depending upon several factors such as review schedules and the Institute budget. When approved by the Director for release, an initiative is implemented by Institute staff. However, issuance of a solicitation (RFA or RFP) does not always indicate that obligation of funds will result.

The responsible NHLBI staff member(s) develops the solicitation document, which is then reviewed and must be approved by the NHLBI and NIH. An announcement of availability of the solicitation is released in the *NIH Guide for Grants and Contracts*. Responses undergo peer review under the auspices of the Division of Extramural Affairs, NHLBI. The results of the review are considered by Institute staff in terms of scientific and program balance as well as available resources. A program plan is prepared that documents these results.

For grants and cooperative agreements, the plan undergoes Council review. For contracts, a series of programmatic and administrative reviews are conducted according to the Federal Acquisition Regulations.

#### Mechanisms for Implementing an Initiative

Initiatives generally involve either requests for applications (RFA) for grants or for cooperative agreements, or requests for proposals (RFP) for contracts. For each of the mechanisms, the Institute outlines goals, approaches, and other requirements in detail; announces the availability of resources and their approximate magnitude; sets a single due date for the responses; and maintains a coordinating or collaborative role with the program participants. Applications are then reviewed under the auspices of the Division of Extramural Affairs by a specially convened expert group. Once the awards are made, NHLBI staff arrange periodic meetings of the specific program investigators and other relevant NHLBI investigators to foster communication and exchange scientific information during the course of the program.

Another approach for stimulating research is the program announcement. In contrast to the RFA and RFP mechanisms, a program announcement indicates a special interest of the Institute in supporting an activity or in reaching a goal, but it neither details the goals or approaches nor establishes requirements. No special resources are available and no single due date for responses is specified. Responses receive the same study section review as other investigator-initiated grant applications, but the Institute's programmatic interests enter into their further assessment. After award, there is ordinarily no coordinating or collaborative role by Institute staff other than the regular administration of research grants.

### Evaluation

The Institute's responsibility for its programs does not end with their implementation. There is a continuing need to compare progress in each of the National Program areas with specific goals and objectives, to assess the state of the science in areas covered by the NHLBI mission, and to identify areas of research need and capitalize on scientific opportunity. The NHLBI evaluates its programs by relying upon a diverse set of techniques that are combined to form a disciplined strategy. The Institute's evaluation activities include:

- Collection and analysis of data to monitor continuing programs,
- Acquisition of expert scientific judgment to assess progress toward research objectives,
- Assessment of the results or effectiveness of concluded programs, and
- Detailed analyses of National Program goals and the appropriateness of planned Institute activities in meeting those goals.

# 7. Council and Advisory and Review Committees

## National Heart, Lung, and Blood Advisory Council

### Structure

*Chairman:* Director, National Heart, Lung, and Blood Institute

The Secretary of Health and Human Services (HHS) appoints 18 members: 12 members are leading representatives of the health and scientific disciplines (including public health and the behavioral or social sciences), and 6 are from the general public and are leaders in the fields of public policy, law, health policy, economics, and management.

Members are appointed for overlapping terms of 4 years.

The Council includes the following ex officio members:

- Secretary of Health and Human Services
- Director, National Institutes of Health
- Director, NHLBI
- Chief Medical Director, or Designee, Veterans Affairs
- Assistant Secretary of Defense for Health Affairs, or Designee

### Functions

The National Heart, Lung, and Blood Advisory Council reviews applications for research grants, cooperative agreements, and training grants in heart, blood vessel, lung, and blood diseases and in blood resources, and recommends to the Director, NIH, the approval of scientific projects that merit support.

In its advisory role, the Council advises the Secretary, HHS, the Assistant Secretary for Health, HHS, and the Directors, NIH and NHLBI, on matters relating to the causes, prevention, and methods of diagnosis and treatment of diseases and resources within the purview of the Institute. As stated in its charter, the Council also "may review any grant, contract, or cooperative agreement proposed to be made or entered into by the Institute; may make recommendations to the Director of the Institute respecting research conducted at the Institute; may collect, by correspondence or by personal investigation, information as to studies which are being carried on in the United States or any other country with respect to the cause, prevention, diagnosis, and treatment of heart, blood vessel, lung, and blood diseases, and to the use of blood and blood products and the management of blood resources and with the approval of the Director of the Institute, make available such information through appropriate publications for the benefit of public and private health entities and health professions personnel and scientists and for the information of the general public; and may appoint subcommittees and convene workshops and conferences." The Council may also make recommendations to the Director, NIH, and other authorized officials regarding the acceptance of conditional gifts pursuant to Section 2501 of the Public Health Service Act.

### Meetings

The chairman convenes meetings not fewer than four times a year and approves the agenda.

## National Heart, Lung, and Blood Advisory Council Membership*

Claude Lenfant, M.D.
*(Chairman)*
Director
National Heart, Lung, and Blood Institute
National Institutes of Health
Bethesda, Maryland 20892

Henry W. Blackburn, Jr., M.D. (1992)
Professor and Director
School of Public Health
University of Minnesota
Minneapolis, Minnesota 55455

Thomas F. Boat, M.D. (1991)
Professor of Pediatrics
University of North Carolina
Chapel Hill, North Carolina 27514

Eugene Braunwald, M.D. (1991)
Professor of Medicine
Harvard Medical School
Boston, Massachusetts 02115

John A. Clements, M.D. (1993)
Professor of Pulmonary Biology
Cardiovascular Research Institute
University of California, San Francisco
San Francisco, California 94143

Suzanne Cummings (1990)
Beverly Hills, California 90210

Janice G. Douglas, M.D. (1993)
Professor of Medicine
School of Medicine
Case Western Reserve University
Cleveland, Ohio 44106

Jacqueline C. Flowers (1992)
Director
Office of Minority Affairs
Associated Medical Schools of New York
New York, New York 10018

Antonio M. Gotto, Jr., M.D., Ph.D. (1990)
Professor of Medicine and Biochemistry
Baylor College of Medicine
Houston, Texas 77030

Marcellus Grace, Ph.D. (1993)
Dean
College of Pharmacy
Xavier University of Louisiana
New Orleans, Louisiana 70125

Tibor J. Greenwalt, M.D. (1990)
Deputy Director of Research
Hoxworth Blood Center
University of Cincinnati
Cincinnati, Ohio 45267

Francis J. Klocke, M.D. (1992)
Professor
State University of New York
Buffalo, New York 14215

Donald J. Massaro, M.D. (1992)
Professor of Medicine and Physiology
University of Miami School of Medicine
Miami, Florida 33101

Thalia Papayannopoulou, M.D. (1993)
Professor of Medicine
School of Medicine
University of Washington
Seattle, Washington 98195

Samuel I. Rapaport, M.D. (1992)
Professor of Medicine and Pathology
University of California, San Diego Medical Center
San Diego, California 92103

David C. Sabiston, Jr., M.D. (1991)
Professor of Surgery
Duke University Medical Center
Durham, North Carolina 27710

M. Roy Schwarz, M.D. (1991)
Assistant Executive Vice President
American Medical Association
Chicago, Illinois 60610

Hans Weill, M.D. (1990)
Professor of Medicine
Tulane University School of Medicine
New Orleans, Louisiana 70112

Zachariah P. Zachariah, M.D. (1993)
Director, Cardiovascular Laboratories
Holy Cross Hospital
Ft. Lauderdale, Florida 33308

### Ex Officio Members

William P. Baker, M.D., Ph.D.
Professor of Medicine
Uniformed Services University of the Health Sciences
Bethesda, Maryland 20814

Ross D. Fletcher, M.D.
Chief
Cardiology Section
Veterans Administration Medical Center
Washington, D.C. 20422

William F. Raub, Ph.D.
Acting Director
National Institutes of Health
Bethesda, Maryland 20892

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*Current as of September 1990.

## Public Advisory and Review Committees

### Arteriosclerosis, Hypertension, and Lipid Metabolism Advisory Committee

**Chairman:** Willa A. Hsueh, M.D., University of Southern California

**Executive Secretary:** Gardner C. McMillan, M.D., Associate Director for Arteriosclerosis, Hypertension, and Lipid Metabolism, Division of Heart and Vascular Diseases, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-1613

The Arteriosclerosis, Hypertension, and Lipid Metabolism Advisory Committee advises the Directors, NIH, NHLBI, and Division of Heart and Vascular Diseases, NHLBI, on the planning, execution, and evaluation of the Institute's extramural programs, including those relating to grants, contracts, specialized centers of research, and research and demonstration centers in the general areas of lipid metabolism and the etiology and pathogenesis of arteriosclerosis and of hypertension. The committee counsels and assists in the scientific design and review of current programs, particularly with regard to content, relevance to the appropriate portions of the Institute's National Heart, Blood Vessel, Lung, and Blood Program, and cost. The committee also identifies and evaluates future research needs and opportunities and programs in these areas.

### Membership*

Thomas E. Carew, Ph.D. (1993)
University of California, San Diego

Richard A. Carleton, M.D. (1991)
Memorial Hospital of Rhode Island

Allen W. Cowley, Ph.D. (1991)
Medical College of Wisconsin

Wilbert Gamble, Ph.D. (1994)
NIH Experimental Atherosclerosis Laboratory

Godfrey S. Getz, M.D. (1994)
University of Chicago

Philip Greenland, M.D. (1993)
Strong Memorial Hospital
Rochester, New York

Murray Heimberg, M.D. (1992)
University of Tennessee

Helen H. Hobbs, M.D. (1994)
University of Texas, Southwest Medical Center

Penny Margaret Kris-Etherton, Ph.D. (1991)
The Pennsylvania State University

Friedrich C. Luft, M.D. (1992)
Indiana University

John McGiff, M.D. (1991)
New York Medical College

Maria I. New, M.D. (1994)
Cornell University Medical Center

David Robertson, M.D. (1993)
Vanderbilt University

Russell Ross, D.D.S., Ph.D. (1994)
University of Washington

Christine Seidman, M.D. (1993)
Harvard Medical School

Jack P. Strong, M.D. (1993)
Louisiana State University, New Orleans

John A. Watson, Ph.D. (1991)
University of California, San Francisco

William H. Weidman, M.D. (1992)
Mayo Clinic

### Cardiology Advisory Committee

**Chairman:** J. David Bristow, M.D., Oregon Health Sciences University

**Executive Secretary:** Michael J. Horan, M.D., Associate Director for Cardiology, Division of Heart and Vascular Diseases, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-5421

The Cardiology Advisory Committee advises the Directors, NIH, NHLBI, and Division of Heart and Vascular Diseases, NHLBI, on planning, execution, and evaluation of the Institute's extramural programs, including those related to grants, contracts, and specialized centers of research in the general area of cardiology, including cardiac disease, cardiovascular function, and relevant technological developments. The committee also advises and assists in the scientific design and review of current programs.

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*Current as of October 1990.

### Cardiology Advisory Committee (continued)

**Membership***

Margaret E. Billingham, M.D. (1993)
Stanford University

C. Richard Conti, M.D. (1994)
University of Florida

Victor J. Dzau, M.D. (1994)
Stanford University

William F. Friedman, M.D. (1991)
University of California, Los Angeles

J. David Hellums, Ph.D. (1991)
Rice University

Leon Kaufman, Ph.D. (1993)
University of California, San Francisco

John W. Kirklin, M.D. (1993)
University of Alabama at Birmingham

Genell L. Knatterud, Ph.D. (1992)
Maryland Medical Research Institute

Jeanie B. McMillin, Ph.D. (1991)
University of Texas Health Science Center

Jere H. Mitchell, M.D. (1992)
University of Texas Southwestern Medical Center

Thomas W. Smith, M.D. (1992)
Brigham and Women's Hospital

Judith L. Swain, M.D. (1993)
Duke University

Renu Virmani, M.D. (1992)
Walter Reed Army Medical Center

Levi Watkins, Jr., M.D. (1994)
The Johns Hopkins University

Barry Lewis Zaret, M.D. (1994)
Yale University

### Clinical Applications and Prevention Advisory Committee

**Chairman:** Thomas A. Pearson, M.D., M.P.H., Ph.D., Mary Imogene Bassett Research Institute

**Executive Secretary:** William R. Harlan, M.D., Director, Division of Epidemiology and Clinical Applications, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-2533

The Clinical Applications and Prevention Advisory Committee advises the Directors, NIH, NHLBI, and Division of Epidemiology and Clinical Applications, NHLBI, on policy matters relating to epidemiologic and biometrics research programs in clinical trials, behavioral medicine, nutrition and prevention, and demonstration and education; and appraises ongoing studies supported by the NHLBI in these areas. The committee also evaluates proposed contracts, grants, and reimbursable agreements for scientific content and program relevance, and identifies future research needs and opportunities related to the causes and prevention of heart and vascular, pulmonary, and blood diseases and the application of knowledge to the control of those diseases.

**Membership***

Jerome D. Cohen, M.D. (1994)
St. Louis University Medical Center

Edward S. Cooper, M.D. (1994)
University of Pennsylvania Medical Group

Marian R. Fisher, Ph.D. (1992)
Maryland Medical Research Institute

Curt D. Furberg, M.D. (1993)
Bowman Gray School of Medicine

James Alan Herd, M.D. (1993)
Baylor College of Medicine

William B. Kannel, M.D. (1994)
Boston University

Karen A. Matthews, Ph.D. (1991)
University of Pittsburgh

Bertram Pitt, M.D. (1992)
University of Michigan Medical Center

Sachiko T. St. Jeor, Ph.D. (1991)
University of Nevada School of Medicine

Robert B. Wallace, M.D. (1992)
University of Iowa

Roger R. Williams, M.D. (1993)
University of Utah

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*Current as of October 1990.

*Current as of October 1990.

### Pulmonary Diseases Advisory Committee

**Chairman:** James D. Crapo, M.D., Duke University

**Executive Secretary:** Suzanne S. Hurd, Ph.D., Director, Division of Lung Diseases, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-7208

The Pulmonary Diseases Advisory Committee advises the Directors, NIH, NHLBI, and Division of Lung Diseases, NHLBI, on aims, progress, and productivity of goal-oriented programs of the Institute, such as Pulmonary Specialized Centers of Research and research contracts. The committee also identifies research opportunities and evaluates current and future program needs in the pulmonary disease area.

#### Membership*

Jerome S. Brody, M.D. (1991)
Boston University

Joan G. Clark, M.D. (1991)
University of Washington

Harvey R. Colten, M.D. (1991)
Washington University

Edward D. Crandall, M.D., Ph.D. (1994)
Cornell University Medical College

Jeffrey M. Drazen, M.D. (1992)
Beth Israel Hospital
Boston, Massachusetts

Edmund A. Egan, M.D. (1993)
The Children's Hospital of Buffalo, New York

Kevin F. Gibson, M.D. (1992)
University of Pittsburgh

John R. Hoidal, M.D. (1992)
University of Utah

Jamson S. Lwebuga-Mukasa, M.D., Ph.D. (1993)
Yale University

Robert J. Mason, M.D. (1994)
National Jewish Center for Immunology and Respiratory Medicine

R. Drew Miller, M.D. (1991)
Mayo Medical School

Brooke T. Mossman, Ph.D. (1994)
University of Vermont

Joseph R. Rodarte, M.D. (1994)
Baylor College of Medicine

Peter A. Ward, M.D. (1992)
The University of Michigan

Sandra R. Wilson, Ph.D. (1993)
American Institutes for Research

### Blood Diseases and Resources Advisory Committee

**Chairman:** Naomi L.C. Luban, M.D., Children's Hospital National Medical Center, Washington, D.C.

**Executive Secretary:** Fann Harding, Ph.D., Assistant to the Director, Division of Blood Diseases and Resources, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-1817

The Blood Diseases and Resources Advisory Committee advises the Directors of NIH, NHLBI, Division of Blood Diseases and Resources, and other Divisions and offices, NHLBI, on long-range goals, program proposals, and research opportunities, and makes recommendations regarding plans for program development and implementation in the areas of thrombosis and hemostasis, blood cell disorders, including sickle cell disease, and transfusion medicine. The committee also evaluates ongoing programs in relation to goals.

#### Membership*

Richard D. Aach, M.D. (1991)
Mount Sinai Medical Center
Cleveland, Ohio

Richard H. Aster, M.D. (1992)
Blood Center of Southeastern Wisconsin

Diana S. Beardsley, M.D., Ph.D. (1994)
Yale University

Jaime Caro, M.D. (1994)
Thomas Jefferson University Medical College

Richard B. Counts, M.D. (1991)
Puget Sound Blood Center

Bruce C. Furie, M.D. (1992)
Tufts University

Thomas C. Kisker, M.D. (1994)
University of Iowa

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*Current as of October 1990.

*Current as of October 1990.

### Blood Diseases and Resources Advisory Committee (continued)

Ronald L. Nagel, M.D. (1993)
Albert Einstein College of Medicine

Peter J. Quesenberry, M.D. (1991)
University of Virginia School of Medicine

Peter T. Rowley, M.D. (1991)
University of Rochester School of Medicine

Barbara P. Schick, Ph.D. (1993)
Thomas Jefferson Hospital, Philadelphia

Marc A. Shuman, M.D. (1992)
University of California, San Francisco

Cladd E. Stevens, M.D. (1993)
New York Blood Center

Carolyn F. Whitsett (1993)
Emory University School of Medicine

### Sickle Cell Disease Advisory Committee

**Chairman:** Oswaldo Castro, M.D., Howard University College of Medicine

**Executive Secretary:** Clarice D. Reid, M.D., Chief, Sickle Cell Disease Branch, Division of Blood Diseases and Resources, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-6931

The Sickle Cell Disease Advisory Committee advises the Secretary, HHS, the Assistant Secretary for Health, HHS, and the Director, NIH, on the Sickle Cell Disease Program and on suggested priorities within that program. The committee also makes recommendations concerning planning, execution, and evaluation of all aspects of the program.

### Membership*

Lennette Benjamin, M.D. (1994)
Montefiore Hospital Medical Center

James E. Bowman, M.D. (1994)
University of Chicago

Stephen Embury, M.D. (1991)
San Francisco General Hospital

Clinton H. Joiner, M.D., Ph.D. (1994)
University of Cincinnati School of Medicine

Thomas R. Kinney, M.D. (1991)
Duke University School of Medicine

Kermit B. Nash, Ph.D. (1992)
University of North Carolina School of Medicine

Darnelle D. Pinkard, M.S.W. (1992)
Pinkard and Associates, Houston, Texas

Orah S. Platt, M.D. (1991)
Children's Hospital Medical Center
Boston, Massachusetts

Darleen Powars, M.D. (1992)
University of Southern California, Los Angeles

Rose M.G. Thomas (1994)
University of Illinois at Chicago

### Ex Officio Members

John Grovall, M.D.
Department of Veterans Affairs

Robert Harmon, M.D.
Health Resources and Services Administration, DHHS

Enrique Mendez, Jr., M.D.
Department of Defense

William F. Raub, M.D.
National Institutes of Health

William L. Roper, M.D.
Centers for Disease Control

### Office of Prevention, Education and Control Advisory Committee†

**Chairman:** Barbara Packard, M.D., Ph.D., Associate Director for Scientific Program Operation and Director, Office of Program Planning and Evaluation, NHLBI

**Executive Secretary:** Geraldine Wolfle, Office of Program Planning and Evaluation, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-9899

The Office of Prevention, Education and Control Advisory Committee advises the Director, NHLBI, and the Associate Director for Prevention, Education, and Control, NHLBI, on education and information issues relating to cardiovascular, lung, and blood diseases and blood resources. The committee also provides advice on allocating resources for prevention, education, and control activities, taking into account the need for setting priorities among competing demands.

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*Current as of October 1990.

†Not officially chartered.

### Office of Prevention, Education and Control Advisory Committee (continued)

**Membership***

Richard A. Carleton, M.D.
Memorial Hospital of Rhode Island

Noreen M. Clark, Ph.D.
The University of Michigan

Stephen Ficca
Office of the Director, NHLBI

William T. Friedewald, M.D.
Metropolitan Life Insurance Company

Tibor Greenwalt, M.D.
University of Cincinnati

William T. Harlan, M.D.
Division of Epidemiology and Clinical Applications, NHLBI

John C. Hoak, M.D.
Division of Blood Diseases and Resources, NHLBI

Suzanne S. Hurd, Ph.D.
Division of Lung Diseases, NHLBI

Martha N. Hill, Ph.D., R.N.
University of Pennsylvania

John Karefa-Smart, M.D., M.P.H.
Ad Hoc Committee on Minority Populations, NHLBI

William D. Nelligan
American College of Cardiology

Eugene Passamani, M.D.
Division of Heart and Vascular Diseases, NHLBI

Ronald Geller, Ph.D.
Division of Extramural Affairs, NHLBI

### Clinical Trials Review Committee

**Chairman:** Cage S. Johnson, M.D., University of Southern California

**Executive Secretary:** David M. Monsees, Jr., Ph.D., Review Branch, Division of Extramural Affairs, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-7361

The Clinical Trials Review Committee provides technical advice to the Directors, NIH and NHLBI, and to the National Heart, Lung, and Blood Advisory Council, including initial review of applications for the support of studies to evaluate preventive or therapeutic measures in blood, cardiovascular, or lung diseases, particularly through cooperative studies or controlled clinical trials. The committee also provides scientific merit review for such studies that seek grant or contract support from the NHLBI.

**Membership***

M. Donald Blaufox, M.D. (1992)
Albert Einstein College of Medicine

Lawrence S. Cohen, M.D. (1991)
Yale University

Gary R. Cutter, Ph.D. (1994)
St. Jude's Children's Research Hospital

David R. Dantzker, M.D. (1993)
Long Island Jewish Medical Center

Kathryn Davis, Ph.D. (1991)
University of Washington

Gail C. Frank, Dr.P.H. (1991)
California State University at Long Beach

Lael C. Gatewood, Ph.D. (1994)
University of Minnesota

Scott H. Goodnight, Jr., M.D. (1993)
Oregon Health Sciences University

Alan D. Guerci, M.D. (1994)
The Johns Hopkins University

Thomas Hyers, M.D. (1992)
St. Louis University Medical Center

Sonja M. McKinlay, Ph.D. (1991)
New England Research Institute, Inc.

Jorge C. Rios, M.D. (1993)
George Washington University

Michael Weintraub, M.D. (1992)
University of Rochester

### Heart, Lung, and Blood Research Review Committee A

**Chairman:** Paul M. Vanhoutte, M.D., Ph.D., Baylor College of Medicine

**Acting Executive Secretary:** Louis M. Ouellette, Ph.D., Review Branch, Division of Extramural Affairs, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-7915

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*Current as of October 1990.

*Current as of October 1990.

## Heart, Lung, and Blood Research Review Committee A (continued)

The Heart, Lung, and Blood Research Review Committee A provides technical advice to the National Heart, Lung, and Blood Advisory Council and to the Directors, NIH and NHLBI, in areas relating to the fundamental processes and diseases of the heart and lungs. The committee also reviews program project grant applications, other grants-in-aid, and contract proposals for the support of programs of multidisciplinary basic, clinical, and behavioral cardiovascular research.

### Membership*

Richard C. Boucher, M.D. (1994)
University of North Carolina

Jacqueline J. Coalson, Ph.D. (1994)
University of Texas Health Science Center

Jay N. Cohn, M.D. (1994)
University of Minnesota

James W. Covell, M.D. (1992)
University of California, San Diego

Charles K. Francis, M.D. (1994)
Harlem Hospital Center

Carl Franzblau, M.D. (1993)
Boston University

David R. Hathaway, M.D. (1994)
Indiana University

Michael P. Hlastala, Ph.D. (1992)
University of Washington

Joanne S. Ingwall, Ph.D. (1993)
Harvard Medical School

Jose Jalife, M.D. (1992)
State University of New York

Margaret L. Kirby, Ph.D. (1991)
Medical College of Georgia

Michael R. Rosen, M.D. (1992)
Columbia University

Antonio Scarpa, Ph.D. (1994)
Case Western Reserve University

Robert M. Senior, M.D. (1991)
Washington University

Edward B. Stinson, M.D. (1993)
Stanford University

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*Current as of October 1990.

## Heart, Lung, and Blood Research Review Committee B

**Chairman:** Joel S. Bennett, M.D., University of Pennsylvania

**Executive Secretary:** Jeffrey H. Hurst, Ph.D., Review Branch, Division of Extramural Affairs, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-4485

The Heart, Lung, and Blood Research Review Committee B provides technical advice to the National Heart, Lung, and Blood Advisory Council and to the Directors, NIH and NHLBI, relating to the fundamental processes and diseases of blood vessels and blood, to blood banking and resources, to hypertension, and to atherosclerosis. The committee reviews program project grant applications, other grants-in-aid, and contract proposals for the support of programs of multidisciplinary basic and clinical research.

### Membership*

John A. Bevan, M.D. (1992)
University of Vermont

Robert M. Bookchin, M.D. (1993)
Albert Einstein College of Medicine

Oscar A. Carretero, M.D. (1993)
Henry Ford Hospital

Guy M. Chisholm III, Ph.D. (1994)
The Cleveland Clinic Foundation

Alan M. Fogelman, M.D. (1993)
UCLA Medical Center

Jean W. MacCluer, M.D. (1993)
Southwest Foundation for Biomedical Research

Robert R. Montgomery, M.D. (1991)
Blood Center of Southeast Wisconsin

L. Gabriel Navar, Ph.D. (1994)
Tulane University

Ellinor I.B. Peerschke, Ph.D. (1994)
State University of New York at Stony Brook

Michael C. Phillips, Ph.D. (1992)
The Medical College of Pennsylvania

Michael A. Reidy, Ph.D. (1994)
University of Washington

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*Current as of October 1990.

### Heart, Lung, and Blood Research Review Committee B (continued)

Jere P. Segrest, M.D., Ph.D. (1991)
University of Alabama at Birmingham

John M. Taylor, Ph.D. (1991)
University of California at San Francisco

Kenneth K. Wu, M.D. (1992)
University of Texas Health Science Center

### Research Training Review Committee

**Chairman:** Gary W. Hunninghake, M.D., University of Iowa

**Executive Secretary:** Kathryn W. Ballard, Ph.D., Review Branch, Division of Extramural Affairs, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-7361

The Research Training Review Committee provides technical advice to the Directors, NIH and NHLBI, and to the National Heart, Lung, and Blood Advisory Council. The committee reviews projects for the support of research manpower training, the Transfusion Medicine Academic Award Program, the Clinical Investigator Award Program, the Physician Scientist Award Program, the Minority School Faculty Development Award, and the National Research Service Awards for Institutional Grants and proposals for conferences and workshops relating to research training and development.

#### Membership*

George W. Brumley, M.D. (1992)
Emory University

Anthony M. Coelho, Jr., Ph.D. (1992)
Southwest Foundation for Biomedical Research, Texas

Bernell R. Coleman, Ph.D. (1994)
Howard University

Gertrude M. Forte, Ph.D. (1991)
University of California, Berkeley

Paul C. Gillette, M.D. (1993)
Medical University of South Carolina

Diana F. Guthaner, M.D. (1993)
Stanford University Medical Center

Melvyn Lieberman, Ph.D. (1994)
Duke University Medical School

Jeanne Lusher, M.D. (1992)
Wayne State University

Jack E. McKenzie, Ph.D. (1993)
Uniformed Services University of the Health Sciences

Elena G. Puszkin, Ph.D. (1993)
Montefiore Hospital Medical Center

Eugene D. Rannels, Ph.D. (1994)
Pennsylvania State University

Neil Schneiderman, Ph.D. (1994)
University of Miami

Stephen M. Schwartz, M.D., Ph.D. (1992)
University of Washington

Pearl T.-C.Y. Toy, M.D. (1992)
University of California, San Francisco

### Board of Scientific Counselors

**Chairman:** Susan S. Taylor, Ph.D., University of California, San Diego

**Executive Secretary:** Edward D. Korn, Ph.D., Director, Division of Intramural Research, NHLBI, National Institutes of Health, Bethesda, Maryland 20892, (301) 496-2116

The Board of Scientific Counselors advises the Director and the Deputy Director for Intramural Research, NIH, and the Directors, NHLBI and Division of Intramural Research, on the intramural research programs of the NHLBI.

#### Membership*

Charles G. Cochrane, M.D. (1992)
Scripps Clinic and Research Foundation

Arnold M. Katz, M.D. (1993)
University of Connecticut Health Center

M. Daniel Lane, Ph.D. (1991)
The Johns Hopkins University

Philip W. Majerus, M.D. (1994)
Washington University School of Medicine

Thomas E. Smith, Ph.D. (1992)
Howard University

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*Current as of October 1990.

*Current as of November 1990.

# 8. Fiscal Year 1990 Budget Overview

## NHLBI Obligations by Budget Mechanism, Fiscal Year 1990

(Dollars in Thousands)

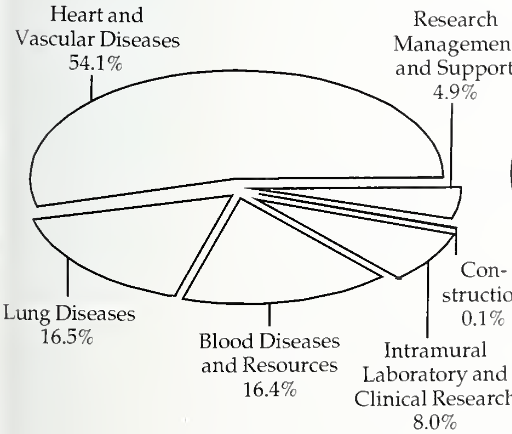
| Budget Mechanism | Obligated Dollars FY 1990* | Percent of Total NHLBI FY 1990 Budget |
|---|---|---|
| Research Project Grants† | $660,722 | 61.7 |
| Specialized Centers of Research (SCORs) | 73,484 | 6.9 |
| Sickle Cell Centers | 14,898 | 1.4 |
| Other Research Grants | 39,841 | 3.7 |
| Research Career Programs | (26,899) | (2.5) |
| Training Programs | 44,445 | 4.1 |
| Research and Development Contracts | 98,377 | 9.2 |
| Intramural Laboratory and Clinical Research | 85,495 | 8.0 |
| Research Management and Support** | 52,766 | 4.9 |
| Research Facilities Construction Grants | 655 | 0.1 |
| **Total, NHLBI**** | **$1,070,683** | **100.0** |

*Excludes money provided by other agencies by means of a reimbursable agreement.

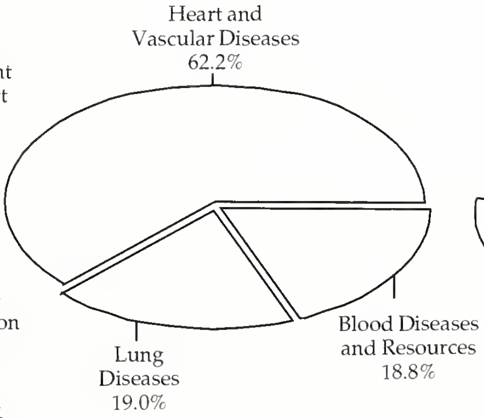
†Includes $11,609,000 for Small Business Innovation Research (SBIR) Grants.

**Excludes OD and DIR research contracts, which are included in R&D contracts.

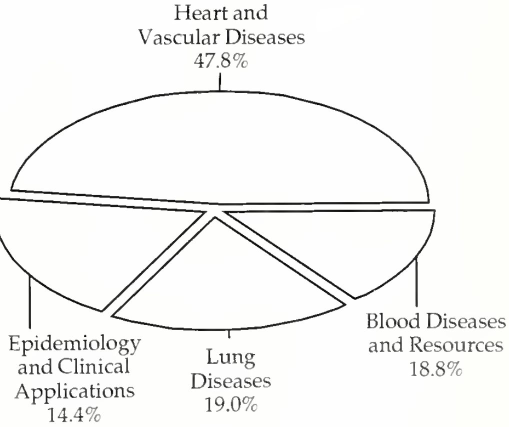
### NHLBI Total Obligations by Budget Category



### NHLBI Extramural Obligations by Program



### NHLBI Extramural Obligations by Division



For detailed data on fiscal year 1990

- research grants, see Chapters 10 and 12;
- research and development contracts, see Chapters 11 and 12;
- research training and career development, see Chapter 13; and
- geographic distribution of awards, see Chapter 14.

## NHLBI Obligations by Program, Fiscal Year 1990

(Dollars in Thousands)

| Program | Obligated Dollars FY 1990 | Percent of NHLBI Extramural FY 1990 Budget |
|---|---|---|
| Heart and Vascular Diseases* | $579,557 | 62.2 |
| Lung Diseases | 176,979 | 19.0 |
| Blood Diseases and Resources | 175,231 | 18.8 |
| **Total, Extramural Obligations** | **$931,767** | **100.0** |

*Includes $444,968 for Heart and Vascular Diseases and $134,589 for Epidemiology and Clinical Applications.

## NHLBI Heart and Vascular Diseases Program* Obligations by Budget Mechanism, Fiscal Year 1990

(Dollars in Thousands)

| Budget Mechanism | Obligated Dollars | Percent of Program Budget |
|---|---|---|
| Research Project Grants | $427,207 | 73.7 |
| Specialized Centers of Research | 40,839 | 7.1 |
| Other Research Grants | 22,676 | 3.9 |
| Research Career Programs | (12,570) | (2.2) |
| Training Programs | 26,658 | 4.6 |
| Research and Development Contracts | 62,177 | 10.7 |
| **Total, Heart and Vascular Diseases** | **$579,557** | **100.0** |

---

*The following table shows obligations by budget mechanism, fiscal year 1990, for Epidemiology and Clinical Applications, included in the Heart and Vascular Diseases Program.

(Dollars in Thousands)

| Budget Mechanism | Obligated Dollars | Percent of Epidemiology and Clinical Applications Budget |
|---|---|---|
| Research Project Grants | $84,807 | 63.0 |
| Specialized Centers of Research | 0 | 0.0 |
| Other Research Grants | 2,767 | 2.1 |
| Research Career Programs | (2,526) | (1.9) |
| Training Programs | 0 | 0.0 |
| Research and Development Contracts | 47,015 | 34.9 |
| **Total, Epidemiology and Clinical Applications** | **$134,589** | **100.0** |

## NHLBI Lung Diseases Program
## Obligations by Budget Mechanism, Fiscal Year 1990

(Dollars in Thousands)

| Budget Mechanism | Obligated Dollars | Percent of Program Budget |
|---|---|---|
| Research Project Grants | $120,996 | 68.4 |
| Specialized Centers of Research | 25,002 | 14.1 |
| Other Research Grants | 9,621 | 5.5 |
| Research Career Programs | (8,433) | (4.8) |
| Training Programs | 11,022 | 6.2 |
| Research and Development Contracts | 10,338 | 5.8 |
| **Total, Lung Diseases** | **$176,979** | **100.0** |

## NHLBI Blood Diseases and Resources Program
## Obligations by Budget Mechanism, Fiscal Year 1990

(Dollars in Thousands)

| Budget Mechanism | Obligated Dollars | Percent of Program Budget |
|---|---|---|
| Research Project Grants | $112,519 | 64.2 |
| Specialized Centers of Research | 7,643 | 4.4 |
| Sickle Cell Centers | 14,898 | 8.5 |
| Other Research Grants | 7,544 | 4.3 |
| Research Career Programs | (5,895) | (3.4) |
| Training Programs | 6,765 | 3.9 |
| Research and Development Contracts | 25,862 | 14.7 |
| **Total, Blood Diseases and Resources** | **$175,231** | **100.0** |

# 9. Long-Term Trends

## Budget History of the NHLBI: Fiscal Years 1950-1991

(Dollars in Thousands)

| Fiscal Year | Budget Estimate to Congress | House Allowance | Senate Allowance | Appropriation | Obligations | Cumulative Fiscal Year Obligations |
|---|---|---|---|---|---|---|
| 1950 | $ 4,630 | $ 11,575 | $ 29,117 | $ 16,075 | $ 15,768 | $ 15,768 |
| 1951 | 8,800 | 8,800 | 9,400 | 9,400 | 8,497 | 24,265 |
| 1952 | 10,237 | 10,074 | 10,156 | 10,083 | 9,850 | 34,115 |
| 1953 | 9,779 | 9,623 | 12,000 | 12,000 | 11,398 | 45,513 |
| 1954 | 11,040 | 12,000 | 15,418 | 15,168 | 14,952 | 60,465 |
| 1955 | 14,570 | 16,168 | 17,168 | 16,668 | 16,595 | 77,060 |
| 1956 | 17,454 | 17,398 | 23,976 | 18,808 | 18,838 | 95,898 |
| 1957 | 22,106 | 25,106 | 33,396 | 33,396 | 32,392 | 128,290 |
| 1958 | 33,436 | 33,436 | 38,784 | 35,936 | 35,973 | 164,263 |
| 1959 | 34,820 | 36,212 | 49,529 | 45,613 | 45,468 | 209,731 |
| 1960 | 45,594 | 52,744 | 89,500 | 62,237 | 61,565 | 271,296 |
| 1961 | 63,162 | 71,762 | 125,166 | 86,900 | 86,239 | 357,535 |
| 1962 | 97,073 | 105,723 | 160,000 | 132,912 | 110,849 | 468,384 |
| 1963 | 126,898 | 143,398 | 149,498 | 147,398 | 120,597 | 588,981 |
| 1964 | 130,108 | 129,325 | 130,545 | 132,404 | 117,551 | 706,532 |
| 1965 | 125,640 | 124,521 | 125,171 | 124,824 | 124,412 | 830,944 |
| 1966 | 141,412 | 146,212 | 143,462 | 141,462 | 141,171 | 972,115 |
| 1967 | 148,407 | 154,770 | 164,770 | 164,770 | 164,342 | 1,136,457 |
| 1968 | 167,954 | 167,954 | 177,954 | 167,954 | 162,134 | 1,298,591 |
| 1969 | 169,735 | 164,120 | 172,120 | 166,928 | 161,834 | 1,460,425 |
| 1970 | 160,513 | 160,513 | 182,000 | 171,257 | 160,433 | 1,620,858 |
| 1971 | 171,747 | 178,479 | 203,479 | 194,901 | 194,826 | 1,815,684 |
| 1972 | 195,492 | 211,624 | 252,590 | 232,627 | 232,577 | 2,048,261 |
| 1973 | 255,280 | 300,000 | 350,000 | 300,000 | 255,722 | 2,303,983 |
| 1974 | 265,000 | 281,415 | 320,000 | 302,915[1] | 327,270[2] | 2,631,253 |
| 1975 | 309,299 | 321,196 | 330,000 | 327,996[3] | 327,953[3] | 2,959,206 |
| 1976 | 324,934 | 329,079[4] | 379,059[4] | 370,096[5] | 368,648 | 3,327,854 |
| TQ[6] | 59,715 | 58,015 | 58,015 | 58,763 | 60,639[7] | 3,388,493 |
| 1977 | 342,855 | 380,661 | 420,661 | 396,661 | 396,857[8] | 3,785,350 |
| 1978 | 403,642 | 432,642 | 456,000 | 447,901 | 447,968[8] | 4,233,318 |
| 1979 | 454,336 | 485,584[4] | 485,584[4] | 510,134[9] | 510,080 | 4,743,398 |
| 1980 | 507,344 | 527,544 | 527,544 | 527,544 | 527,248 | 5,270,646 |
| 1981 | 532,799 | 560,264 | 565,264 | 549,693 | 550,072[8] | 5,820,718 |
| 1982 | 579,602 | 583,831 | 587,741 | 559,637 | 559,800[8] | 6,380,518 |
| 1983 | 577,143 | 620,947 | 624,542 | 624,259 | 624,260[8] | 7,004,778 |
| 1984 | 639,774 | 665,859[4] | 683,489[4] | 704,939[10] | 705,064 | 7,709,842 |
| 1985 | 718,852 | 764,135[4] | 807,149 | 805,269 | 803,810[11] | 8,513,652 |
| 1986 | 775,254 | 856,388[4] | 863,652 | 859,239[12] | 821,901 | 9,335,553 |
| 1987 | 785,697 | 921,410 | 921,502 | 930,001 | 929,982 | 10,265,535 |
| 1988 | 821,887 | 990,808[13] | 1,000,349 | 965,536 | 965,283 | 11,230,818 |
| 1989 | 1,054,503 | 1,018,983[4] | 1,056,003 | 1,045,985 | 1,045,508 | 12,276,325 |
| 1990 | 1,039,846[13] | 1,090,930 | 1,091,597 | 1,072,354 | 1,070,683 | 13,347,008 |
| 1991 | 1,112,502 | 1,135,589[4] | 1,137,235 | 1,126,942 | | |

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[1] The appropriation was reduced by a provision whereby up to 5% of any activity could be withheld. The adjusted appropriation for fiscal year 1974 was $289,550,000. This was reduced by transfers to $286,465,000.

[2] Includes $40,990,000 obligated in fiscal year 1974 from released fiscal year 1973 funds previously impounded.

[3] Includes $3,226,907 from released fiscal year 1973 funds previously impounded.

[4] Excludes Training and Fellowship Programs.

[5] Includes $20,954,000 continuing resolution for Training and Fellowship Programs.

[6] TQ=Transition Quarter, July 1-September 30, 1976.

[7] Exceeds appropriation due to carryover of unobligated balance from fiscal year 1976.

[8] Exceeds appropriation due to collection of outside reimbursements.

[9] Includes $21,293,000 for Training and Fellowship Programs. Reflects a transfer of $393,000 to OD/NIH for payraise costs.

[10] Includes $28,523,000 continuing resolution for Training and Fellowship Programs.

[11] $813,000 placed in reserve and $639,000 carried forward to fiscal year 1986.

[12] The appropriation was reduced by a sequester order. The adjusted appropriation after sequestration was $822,262,000.

[13] Excludes funds for AIDS research proposed for consolidation in the Office of the Assistant Secretary for Health, DHHS.

# NHLBI Obligations by Budget Category: Fiscal Years 1980-1990

## Current Dollars (Millions): Fiscal Years 1980-1990*

| | Fiscal Year | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | Increase 1980-1990 | Percent Increase 1980-1990 |
| Heart | $308.7 | $318.3 | $321.4 | $357.6 | $400.3 | $455.3 | $475.1 | $533.1 | $552.2 | $581.7 | $579.6 | +$270.9 | +87.8 |
| Lung | 75.3 | 79.2 | 79.9 | 90.8 | 106.1 | 127.0 | 130.0 | 151.2 | 154.3 | 171.4 | 177.0 | +101.7 | +135.1 |
| Blood | 72.4† | 76.8 | 76.6 | 88.6 | 105.8 | 121.7 | 118.5 | 140.9 | 148.7 | 169.3 | 175.2 | +102.8 | +142.0 |
| Intramural | 39.6 | 42.7 | 47.6 | 52.4 | 57.6 | 59.2 | 59.5 | 63.6 | 68.0 | 77.0 | 85.5 | +45.9 | +115.9 |
| Research Management and Support (RMS) | 31.2 | 33.1 | 34.3 | 34.9 | 35.3 | 37.3 | 35.7 | 38.9 | 42.1 | 46.1 | 52.7 | +21.5 | +68.9 |
| Research Facilities Construction Grants | — | — | — | — | — | 3.3 | 3.1 | 2.3 | — | — | 0.7 | +.7 | N/A |
| **Total** | **$527.2** | **$550.1** | **$559.8** | **$624.3** | **$705.1** | **$803.8** | **$821.9** | **$930.0** | **$965.3** | **$1,045.5** | **$1,070.7** | **+543.5** | **+103.1** |

## Constant 1980 Dollars (Millions): Fiscal Years 1980-1990*

| | Fiscal Year | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | Increase 1980-1990 | Percent Increase 1980-1990 |
| Heart | $308.7 | $290.1 | $269.9 | $283.3 | $299.9 | $324.5 | $325.2 | $346.1 | $341.3 | $341.7 | $322.2 | +13.5 | +4.4 |
| Lung | 75.3 | 72.2 | 67.1 | 71.9 | 79.5 | 90.5 | 89.0 | 98.1 | 95.4 | 100.7 | 98.4 | +23.1 | +30.7 |
| Blood | 72.4 | 70.0 | 64.3 | 70.2 | 79.3 | 86.8 | 81.1 | 91.5 | 91.9 | 99.5 | 97.4 | +1.4 | +34.5 |
| Intramural | 39.6 | 38.9 | 40.0 | 41.5 | 43.2 | 42.2 | 40.7 | 41.3 | 42.0 | 45.2 | 47.5 | +7.9 | +19.9 |
| Research Management and Support (RMS) | 31.2 | 30.2 | 28.8 | 27.7 | 26.4 | 26.6 | 24.4 | 25.3 | 26.0 | 27.1 | 29.3 | -7.9 | -6.1 |
| Research Facilities Construction Grants | — | — | — | — | — | 2.4 | 2.1 | 1.5 | — | — | .4 | N/A | N/A |
| **Total** | **$527.2** | **$501.4** | **$470.1** | **$494.7** | **$528.2** | **$573.0** | **$562.5** | **$603.8** | **$596.6** | **$614.2** | **$595.2** | **+68.0** | **+12.9** |

This table is based on the biomedical R&D price index (December 1989).

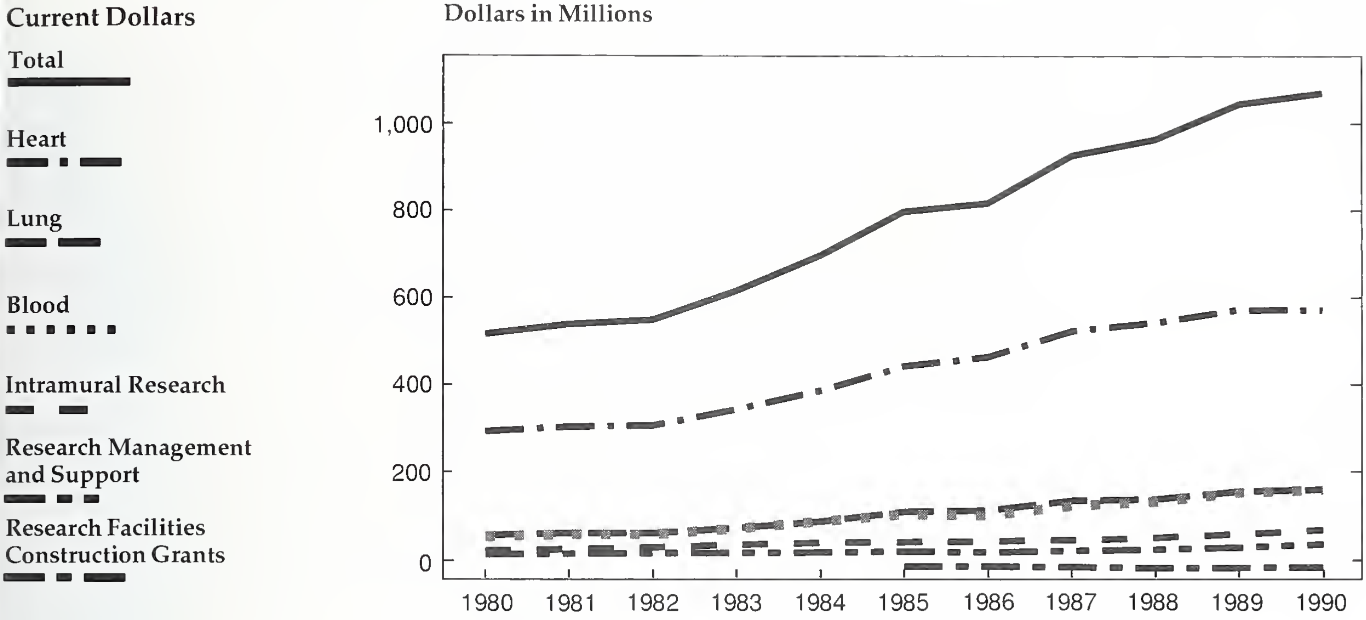
## Budget Categories (Percent): Fiscal Years 1980-1990*

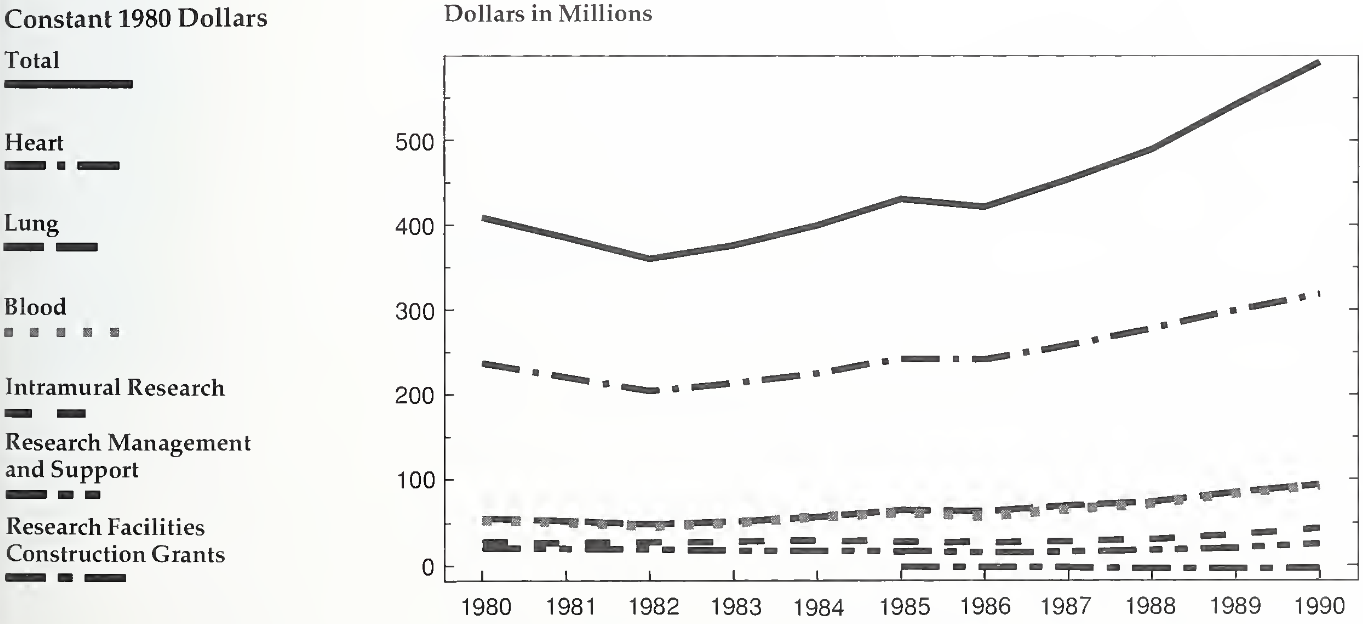
| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Heart | 58.6 | 57.9 | 57.4 | 57.3 | 56.8 | 56.7 | 57.8 | 57.3 | 57.2 | 55.6 | 54.1 |
| Lung | 14.3 | 14.4 | 14.3 | 14.5 | 15.0 | 15.8 | 15.8 | 16.3 | 16.0 | 16.4 | 16.5 |
| Blood | 13.7† | 13.9 | 13.7 | 14.2 | 15.0 | 15.1 | 14.4 | 15.2 | 15.4 | 16.2 | 16.4 |
| Intramural | 7.5 | 7.8 | 8.5 | 8.4 | 8.2 | 7.4 | 7.2 | 6.8 | 7.0 | 7.4 | 8.0 |
| Research Management and Support (RMS) | 5.9 | 6.0 | 6.1 | 5.6 | 5.0 | 4.6 | 4.4 | 4.2 | 4.4 | 4.4 | 4.9 |
| Research Facilities Construction Grants | — | — | — | — | — | 0.4 | 0.4 | 0.2 | — | — | 0.1 |
| **Total** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

*Scientific evaluation grants included in program data.

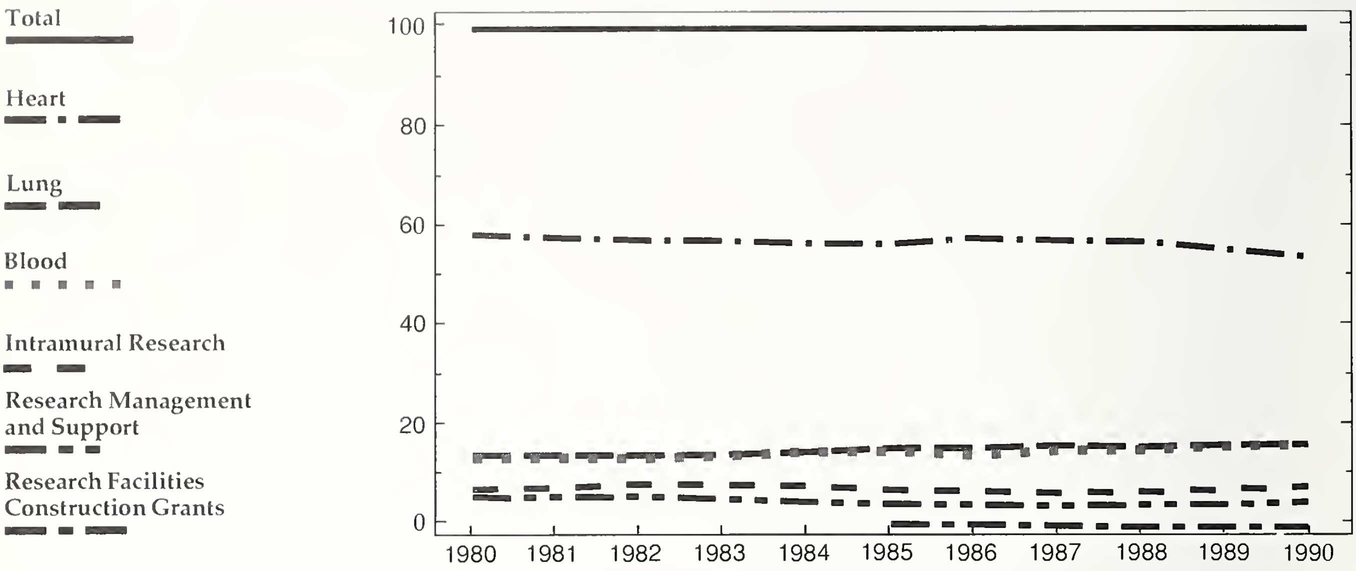
†Funds for the Sickle Cell Clinics ($3.75 million) were appropriated to HSA beginning in fiscal year 1980.

## NHLBI Obligations: Fiscal Years 1980-1990





## Percentage Trends for NHLBI Budget Categories: Fiscal Years 1980-1990*



*Excludes 0.4 percent for Research Facilities Construction Grants in fiscal year 1986.

## NHLBI Obligations and Employment, Fiscal Years 1980-1990

| | | Staff* | | |
|---|---|---|---|---|
| Fiscal Year | Obligations** | Division of Intramural Research | Research Management and Support | Total |
| 1980 | 527.2 | 363 | 373 | 736 |
| 1981 | 550.1 | 327 | 338 | 665 |
| 1982 | 559.8 | 259 | 379 | 638 |
| 1983 | 624.3 | 261 | 378 | 639 |
| 1984 | 705.1 | 249 | 387 | 636 |
| 1985 | 803.8 | 245 | 385 | 630 |
| 1986 | 821.9 | 238 | 384 | 622 |
| 1987 | 930.0 | 245 | 401 | 646 |
| 1988 | 965.3 | 246 | 417 | 663 |
| 1989 | 1,045.5 | 248 | 391 | 639 |
| 1990 | 1,070.7 | 266 | 412 | 678 |

*Full-time permanent as of the end of each fiscal year.
**Dollars in millions.

## NHLBI Obligations by Budget Mechanism, Fiscal Years 1980-1990

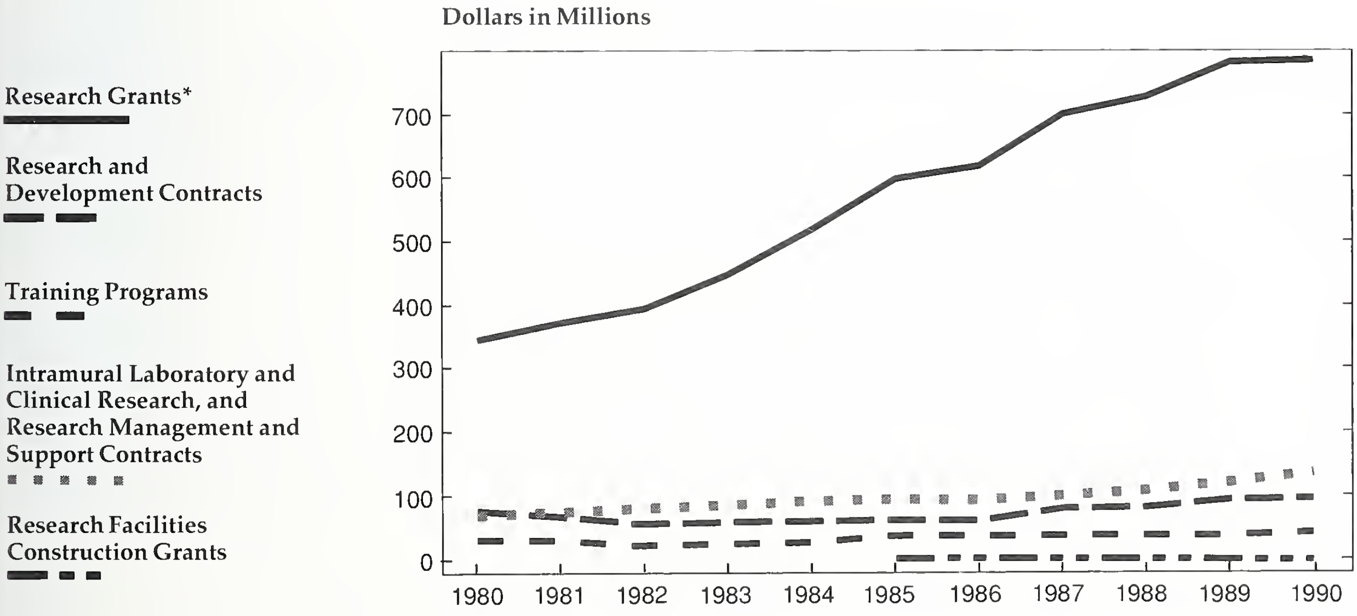
(Dollars in Millions)

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Budget Mechanism** | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| Research Grants* | $346.4 | $374.2 | $396.8 | $450.0 | $521.7 | $601.0 | $622.0 | $703.7 | $731.8 | $785.7 | $788.9 |
| Research and Development (R&D) Contracts | 78.0 | 68.6 | 57.5 | 60.4 | 62.0 | 63.4 | 63.0 | 82.3 | 83.9 | 96.7 | 98.4 |
| Training Programs | 32.0 | 31.5 | 23.6 | 26.6 | 28.5 | 39.6 | 38.5 | 39.2 | 39.5 | 39.9 | 44.4 |
| Intramural Laboratory and Clinical Research (DIR), and Research Management and Support (RMS) | 70.8 | 75.8 | 81.9 | 87.3 | 92.9† | 96.5† | 95.2† | 102.5† | 110.1† | 123.2† | 138.3† |
| Research Facilities Construction Grants | — | — | — | — | — | 3.3 | 3.2 | 2.3 | — | — | 0.7 |
| Total, NHLBI | $527.2 | $550.1 | $559.8 | $624.3 | $705.1 | $803.8 | $821.9 | $930.0 | $965.3 | $1,045.5 | $1,070.7 |

*Includes Research Career Programs.

†Excludes Office of the Director and DIR research contracts, which are included in R&D contracts.

## NHLBI Obligations by Budget Mechanism, Fiscal Years 1980-1990



*Includes Research Career Programs.

## NHLBI Extramural Programs: Fiscal Years 1980-1990

**(Dollars in Millions)**

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Budget Mechanism** | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| Investigator-Initiated Awards | | | | | | | | | | | |
| Investigator-Initiated Grants* | $255.6 | $284.3 | $305.9 | $356.4 | $405.7 | $462.7 | $478.3 | $532.7 | $548.7 | $592.5 | $598.1 |
| Research Career Programs K04, K06 | 11.3 | 12.7 | 13.3 | 14.2 | 15.6 | 22.1 | 22.9 | 26.1 | 25.9 | 25.6 | 26.9 |
| Subtotal | (266.9) | (297.0) | (319.2) | (370.6) | (421.3) | (484.8) | (501.2) | (558.8) | (574.6) | (618.1) | (625.0) |
| Institute-Initiated Awards | | | | | | | | | | | |
| Grants (RFAs) | 78.1 | 75.2 | 77.6 | 79.4 | 100.5 | 116.3 | 120.8 | 144.9 | 157.2 | 167.7 | 164.0 |
| (Centers) | (62.3) | (63.6) | (66.7) | (65.5) | (81.0) | (84.6) | (82.4) | (87.4) | (88.9) | (87.9) | (88.4) |
| R&D Contracts (RFPs) | 78.0 | 68.6 | 57.5 | 60.4 | 60.8 | 63.4 | 63.0 | 82.3 | 83.9 | 96.7 | 98.4 |
| Subtotal | (156.1) | (143.8) | (135.1) | (139.8) | (161.3) | (179.7) | (183.8) | (227.2) | (241.1) | (264.4) | (262.4) |
| Training | 32.0 | 31.5 | 23.6 | 26.6 | 28.5 | 39.6 | 38.5 | 39.2 | 39.5 | 39.9 | 44.4 |
| **Total, Extramural†** | **$455.0** | **$472.3** | **$477.9** | **$537.0** | **$611.1** | **$704.1** | **$723.5** | **$825.2** | **$855.2** | **$922.4** | **$931.8** |

**(As Percent of Total Extramural Funds)**

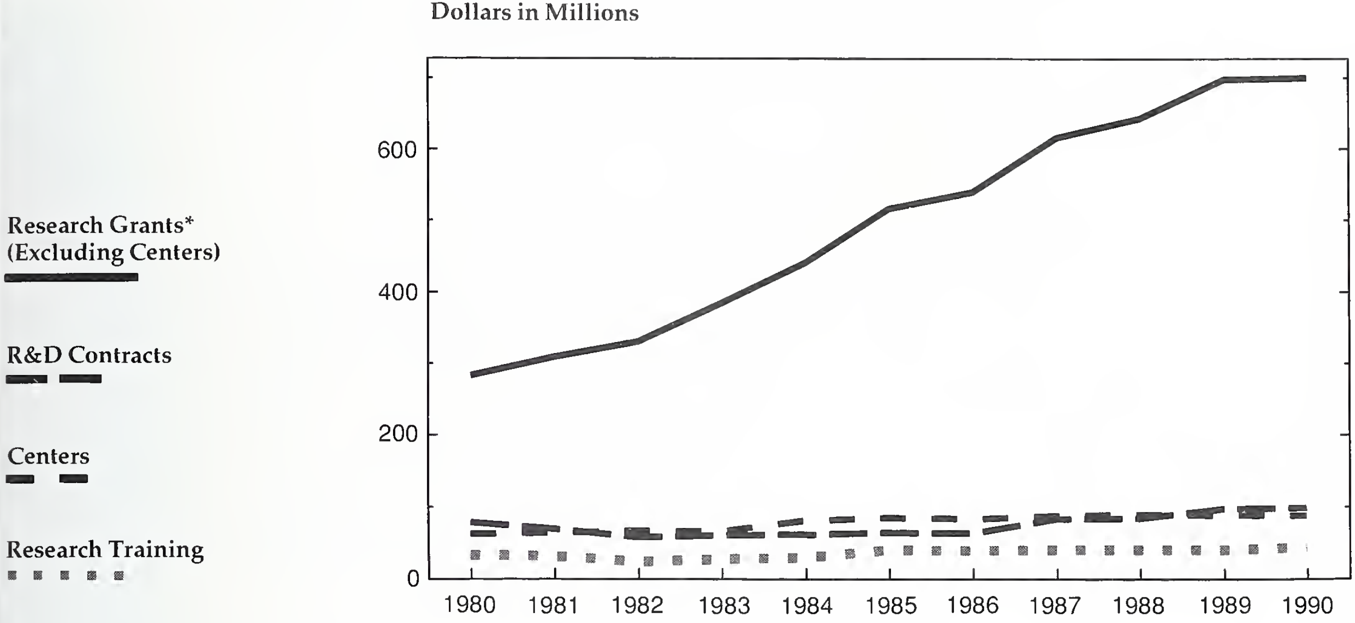
| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| Investigator-Initiated Awards | | | | | | | | | | | |
| Investigator-Initiated Grants* | 56.2% | 60.2% | 64.0% | 66.4% | 66.3% | 65.8% | 66.1% | 64.5% | 64.2% | 64.2% | 64.2% |
| Research Career Programs | 2.5 | 2.7 | 2.8 | 2.6 | 2.6 | 3.1 | 3.2 | 3.2 | 3.0 | 2.8 | 2.9 |
| Subtotal | (58.7) | (62.9) | (66.8) | (69.0) | (68.9) | (68.9) | (69.3) | (67.7) | (67.2) | (67.0) | (67.1) |
| Institute-Initiated Awards | | | | | | | | | | | |
| Grants (RFAs) | 17.2 | 15.9 | 16.2 | 14.8 | 16.4 | 16.5 | 16.7 | 17.6 | 18.4 | 18.2 | 17.6 |
| (Centers) | (13.7) | (13.5) | (14.0) | (12.2) | (13.3) | (12.0) | (11.4) | (10.6) | (10.4) | (9.5) | (9.5) |
| R&D Contracts (RFPs) | 17.1 | 14.5 | 12.0 | 11.2 | 10.0 | 9.0 | 8.7 | 10.0 | 9.8 | 10.5 | 10.6 |
| Subtotal | (34.3) | (30.4) | (28.2) | (26.0) | (26.4) | (25.5) | (25.4) | (27.6) | (28.2) | (28.7) | (28.2) |
| Training | 7.0 | 6.7 | 5.0 | 5.0 | 4.7 | 5.6 | 5.3 | 4.7 | 4.6 | 4.3 | 4.8 |
| **Total†** | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

*Includes all R18s.

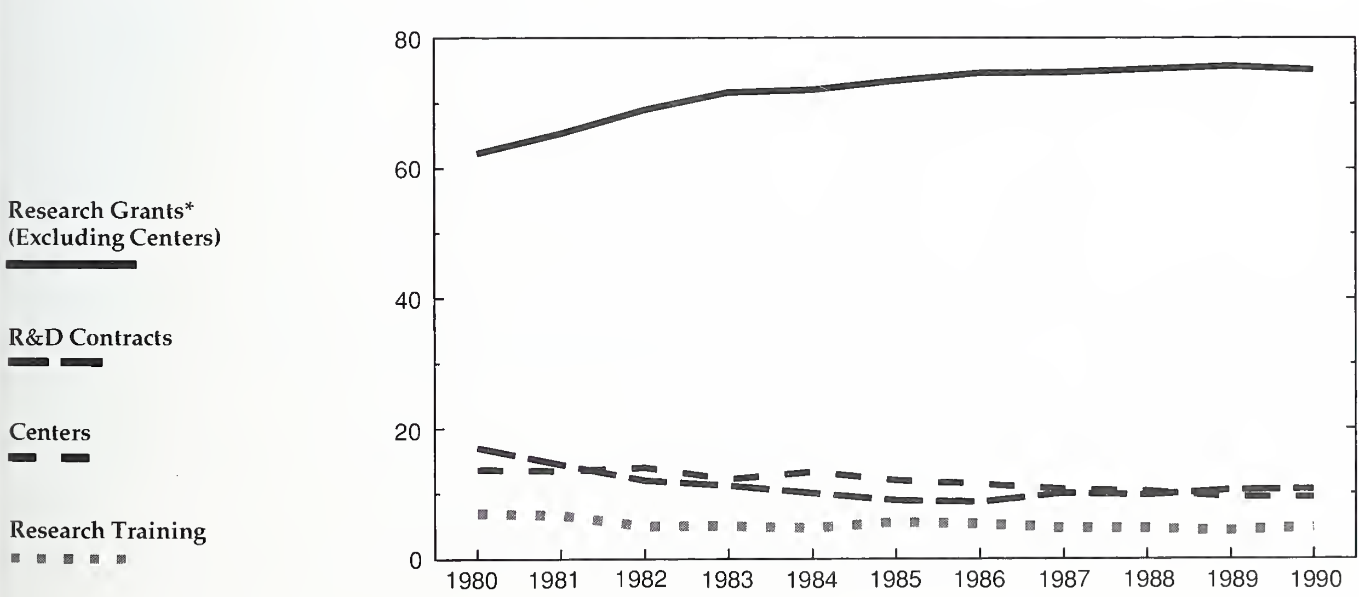
†Excludes Scientific Evaluation Grants, 1978-1983; includes Scientific Evaluation Grants, FY 1984 and thereafter.

## Trends in Extramural Research Funding: NHLBI, Fiscal Years 1980-1990

### Research Grants,* Centers, Research and Development Contracts, and Research Training (Dollars Funded)

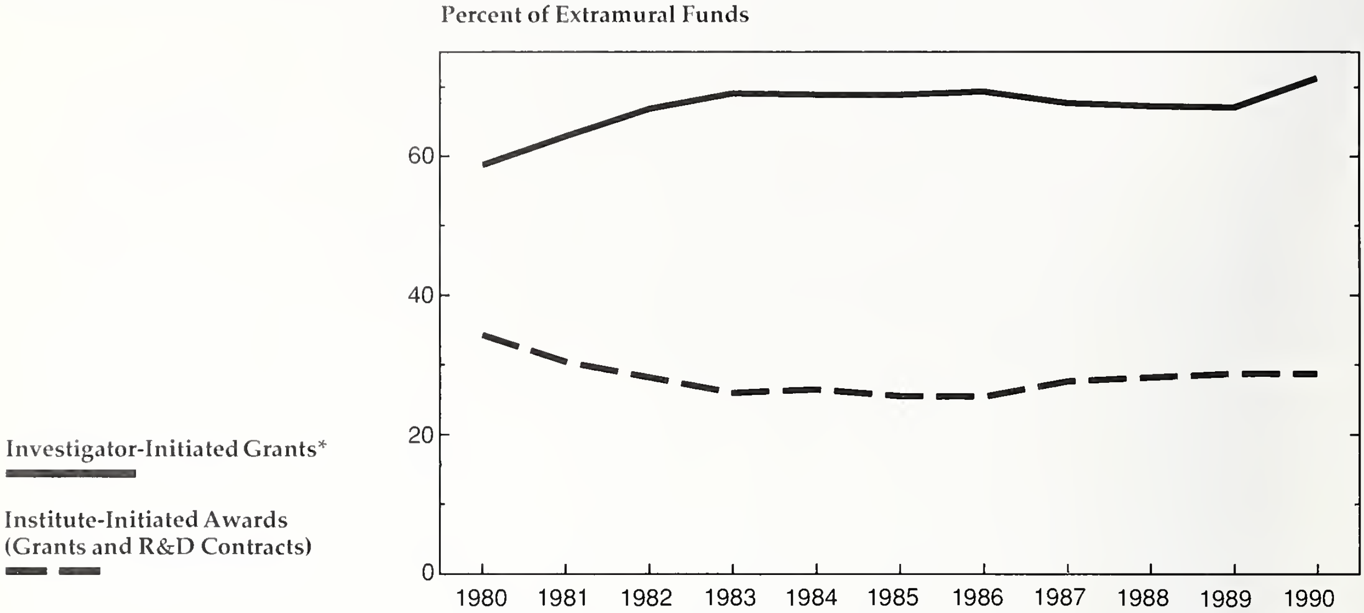


### Research Grants,* Centers, Research and Development Contracts, and Research Training (Percentage Trends)



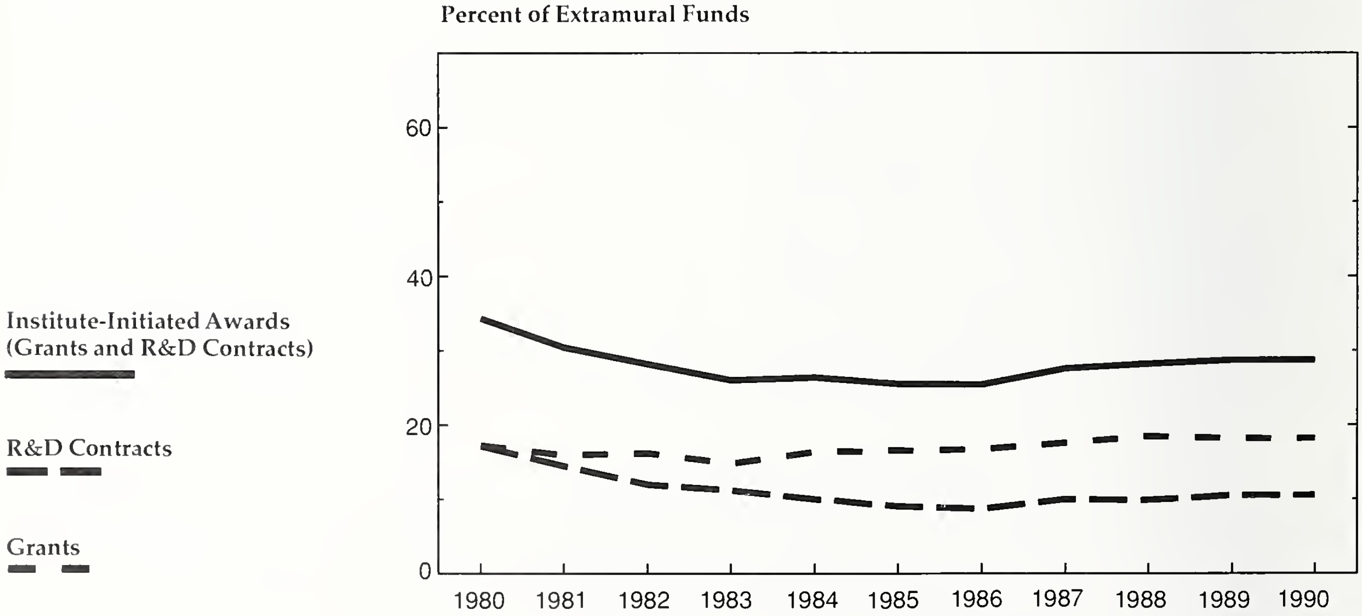
*Includes Research Career Programs.

## Comparison of NHLBI Institute-Initiated vs. Investigator-Initiated Awards: Fiscal Years 1980-1990



*Includes Research Career Programs.

## Comparison of NHLBI Grants and R&D Contracts as Subsets of Institute-Initiated Awards: Fiscal Years 1980-1990



# 10. Research Grants

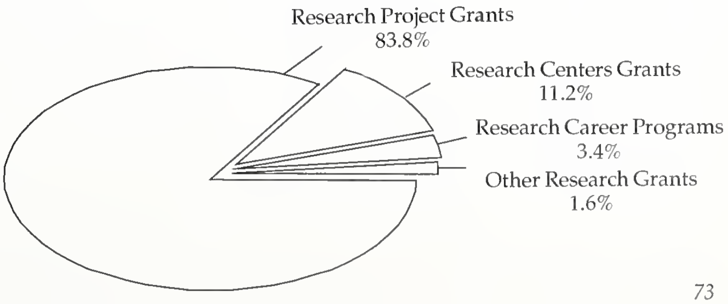
## NHLBI Research Grants by Activity: Fiscal Year 1990

(Dollars in Thousands)

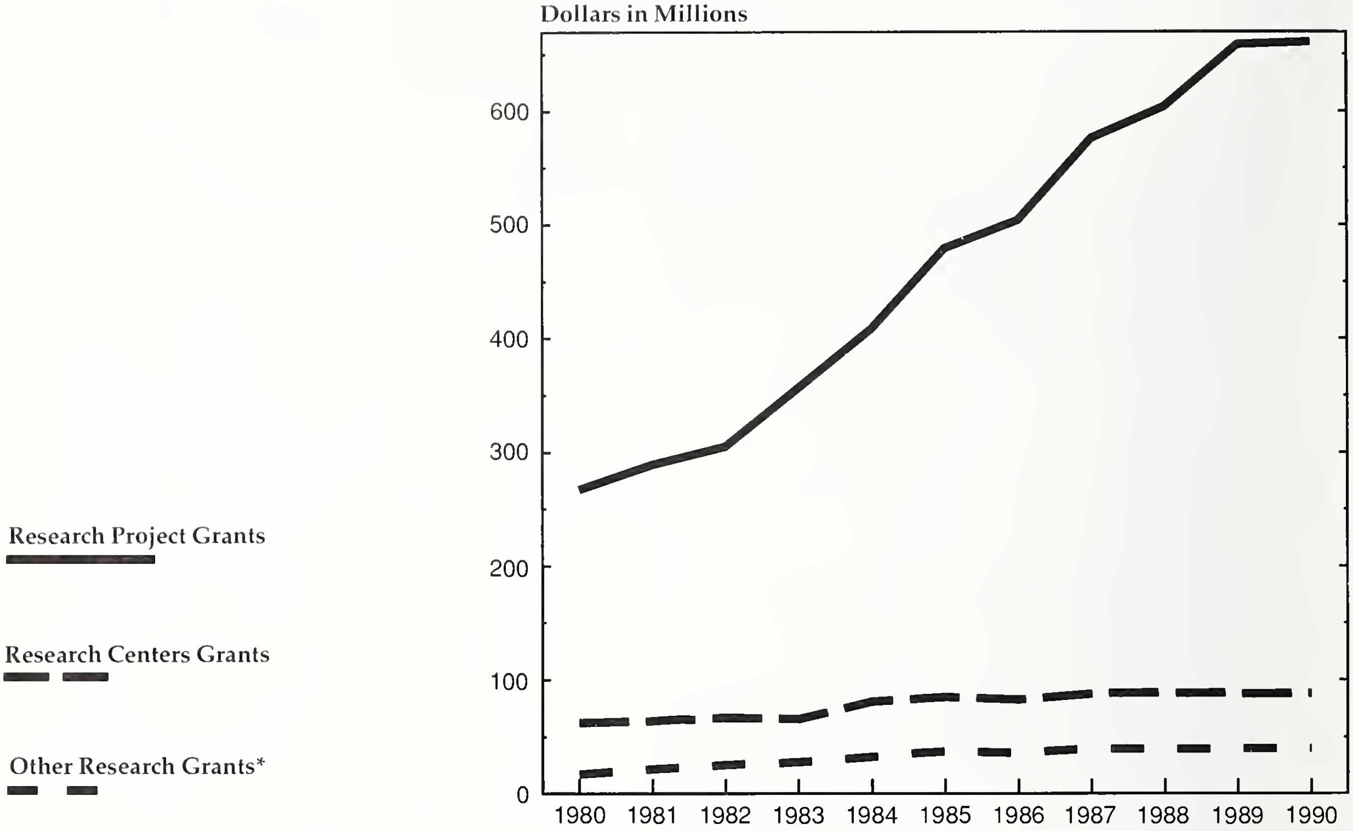
| | Number of Grants Obligated | Direct Cost | Indirect Cost | Total Cost | Percent of Total NHLBI Research Grant Dollars |
|---|---|---|---|---|---|
| **Research Project Grants (RPGs)** | | | | | |
| Regular Research Grants (R01) | 2,085 | 270,332 | 126,999 | 397,330 | 50.4 |
| Cooperative Agreements (U01) | 71 | 20,227 | 7,015 | 27,241 | 3.4 |
| Program Project Grants (P01) | 129 | 110,685 | 51,842 | 162,527 | 20.6 |
| New Investigator Awards (R23) | 0 | 0 | 0 | 0 | 0 |
| FIRST Independent Research Support and Transition Award (R29) | 304 | 19,585 | 9,526 | 29,111 | 3.7 |
| Method to Extend Research in Time (MERIT) (R37) | 146 | 21,424 | 11,479 | 32,904 | 4.2 |
| Small Business Innovation Research (R43) (SBIR Phase I) | 64 | 2,408 | 714 | 3,122 | .4 |
| Small Business Innovation Research (R44) (SBIR Phase II) | 36 | 5,837 | 2,650 | 8,487 | 1.1 |
| (Subtotal, SBIR) | (100) | (8,245) | (3,364) | (11,609) | (1.5) |
| Subtotal, Research Project Grants | 2,835 | 450,497 | 210,225 | 660,722 | 83.8 |
| **Research Centers Grants** | | | | | |
| Specialized Centers of Research (SCOR) (P50) | 52 | 46,505 | 21,077 | 67,583 | 8.6 |
| Enhanced SCOR (P60) | 3 | 3,890 | 2,012 | 5,902 | .7 |
| Sickle Cell Centers (P60) | 10 | 11,958 | 2,940 | 14,898 | 1.9 |
| Subtotal, Research Centers Grants | 65 | 62,353 | 26,029 | 88,382 | 11.2 |
| **Research Career Programs** | | | | | |
| Research Career Development Awards (K04) | 74 | 4,268 | 341 | 4,609 | .6 |
| Research Career Awards (RCA) (K06) | 9 | 281 | 22 | 303 | .04 |
| Preventive Cardiology Academic Awards (PCAA) (K07) | 22 | 2,340 | 186 | 2,526 | .3 |
| Pulmonary Academic Award (PAA) (K07) | 16 | 1,205 | 96 | 1,301 | .2 |
| Transfusion Medicine Academic Awards (TMAA) (K07) | 18 | 1,474 | 116 | 1,590 | .2 |
| Clinical Investigator Awards (CIA) (K08) | 141 | 8,207 | 652 | 8,860 | 1.1 |
| Physician Scientist Awards (PSA) (K11) | 90 | 5,917 | 458 | 6,376 | .8 |
| Minority Faculty Development Awards (K14) | 22 | 1,242 | 93 | 1,334 | .2 |
| Subtotal, Research Career Programs | 392 | 24,934 | 1,965 | 26,899 | 3.4 |
| **Other Research Grants** | | | | | |
| Cooperative Clinical Research (R10) | 12 | 1,585 | 786 | 2,371 | .3 |
| Minority Biomedical Research Support (S06) (S14) | (32) | 1,747 | 671 | 2,418 | .3 |
| Small Instrumentation Grant (S15) | 96 | 3,328 | 0 | 3,328 | .4 |
| Demonstration and Education Program (R18) | 1 | 479 | 140 | 619 | .08 |
| Small Research Grants (R03) | 4 | 157 | 84 | 241 | .03 |
| Other (R09, R25, P09, R13, T15, T09, U09) | 21 | 3,965 | — | 3,965 | .5 |
| Subtotal, Other Research Grants | 134 | 11,261 | 1,681 | 12,942 | 1.6 |
| **Total, NHLBI Research Grants** | **3,426** | **549,045** | **239,899** | **788,945** | **100%** |

*For descriptions of grants see page 147.

**Total Research Grants by Category**



## NHLBI Research Project Grants, Research Centers Grants, and Other Research Grants: Obligations for Fiscal Years 1980-1990



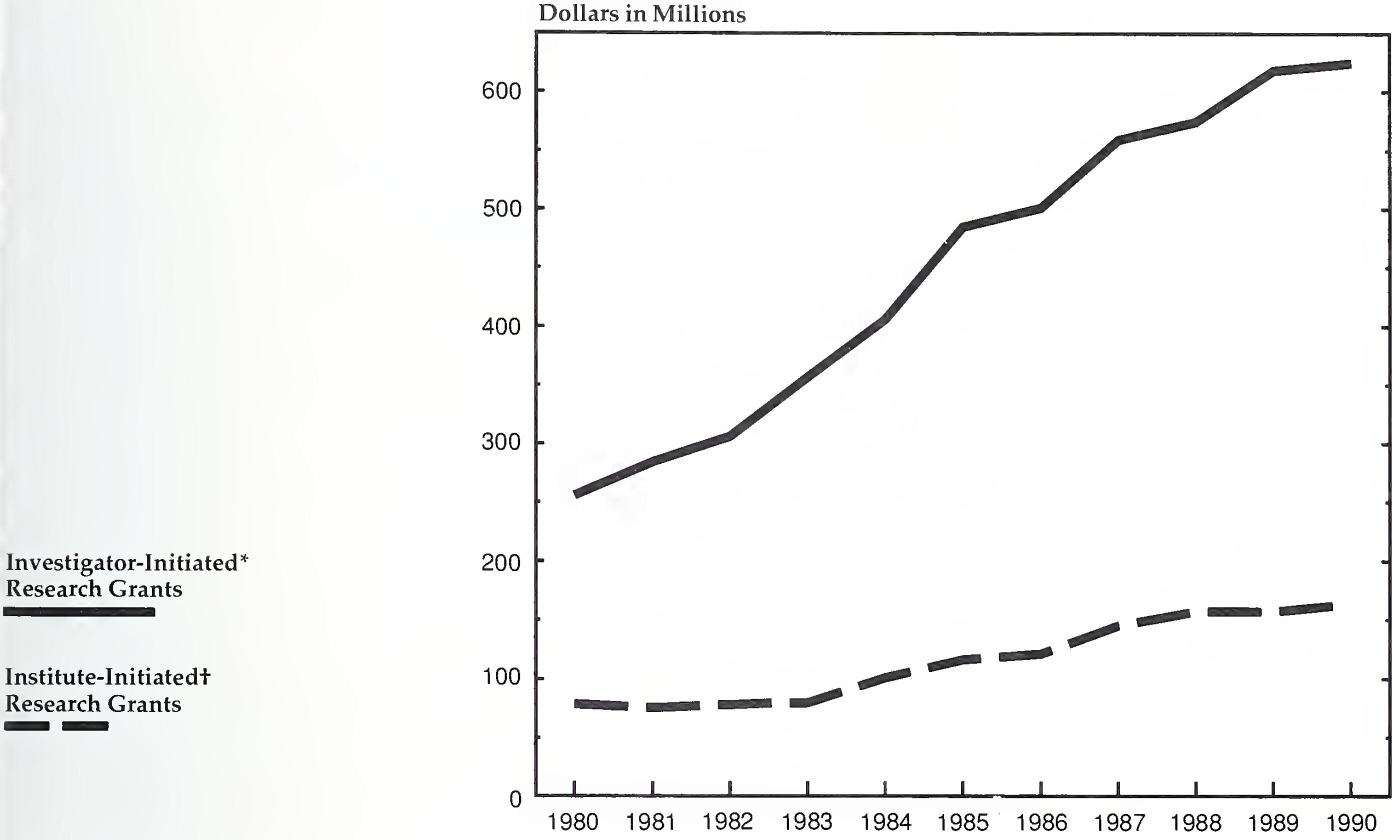
(Dollars in Thousands)

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Research Project Grants* | $266,896 | $289,051 | $305,032 | $356,805 | $408,387 | $479,165 | $504,012 | $576,340 | $603,861 | $658,388 | $660,722 |
| Research Centers Grants | 62,306 | 63,604 | 66,663 | 65,502 | 80,987 | 84,622 | 82,375 | 87,424 | 88,947 | 87,870 | 88,382 |
| Other Research Grants† | 17,308 | 21,686 | 25,022 | 27,677 | 32,337 | 37,206 | 35,669 | 39,946 | 38,999 | 39,524 | 39,841 |
| **Total** | **$346,510** | **$374,341** | **$396,717** | **$449,984** | **$521,711** | **$600,993** | **$622,056** | **$703,710** | **$731,807** | **$785,782** | **$788,945** |

*Includes Program Project Grants (P01).

†Includes Research Career Programs; excludes General Research Support Grants.

## NHLBI Investigator-Initiated vs. Institute-Initiated Research Grants: Total Obligations for Fiscal Years 1980-1990



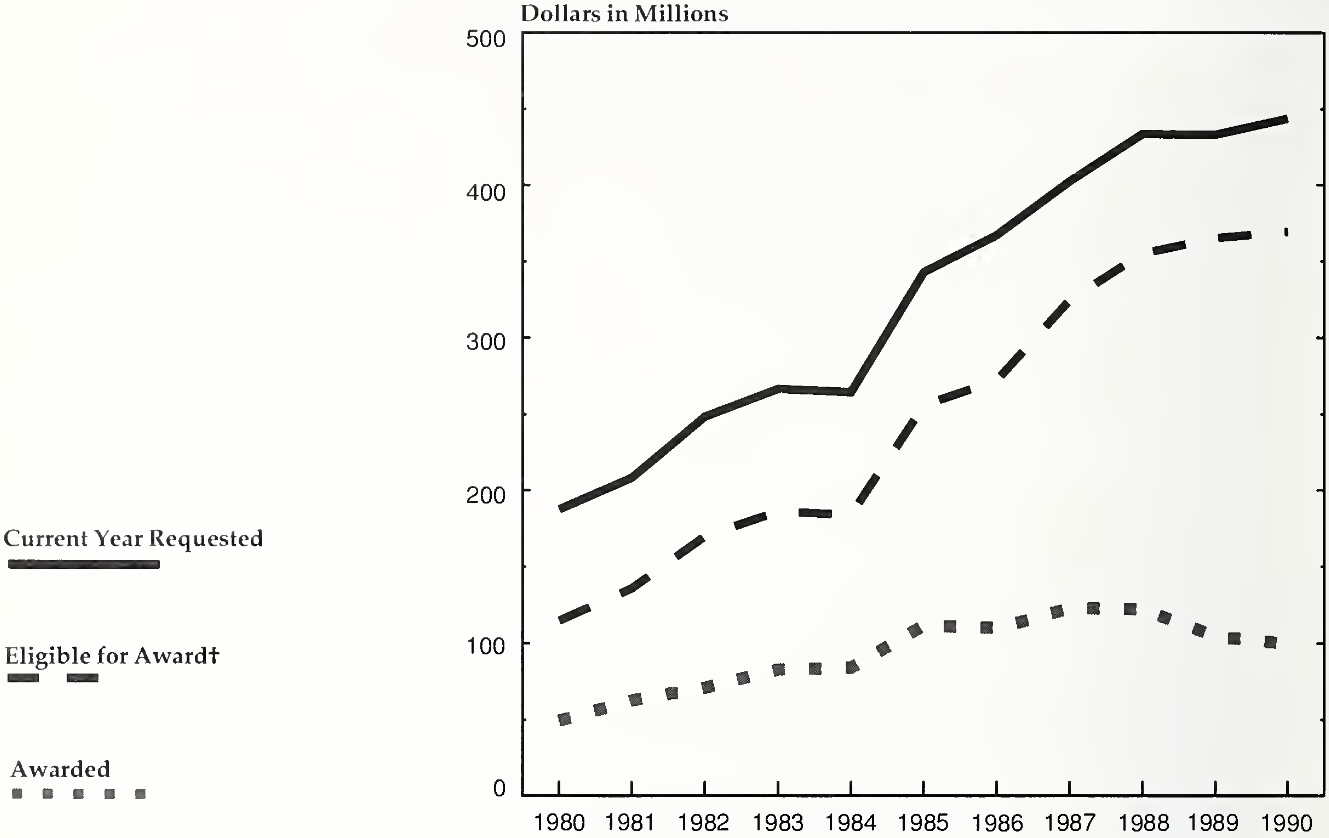
**(Dollars in Millions)**

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| Investigator-Initiated* | $255.6 | $284.3 | $305.9 | $356.4 | $405.7 | $484.8 | $501.2 | $558.8 | $574.6 | $618.1 | $625.0 |
| Institute-Initiated† | 78.1 | 75.2 | 77.6 | 79.4 | 100.5 | 116.3 | 120.8 | 144.9 | 157.2 | 167.7 | 164.0 |
| **Total** | **$333.7** | **$359.5** | **$383.5** | **$435.8** | **$506.2** | **$601.1** | **$622.0** | **$703.7** | **$731.8** | **$785.8** | **$789.0** |

*Includes Regular Research Grants, Program Project Grants, New Investigator Awards, Small Business Innovation Research Grants, Cooperative Agreements, Research Career Programs, Method to Extend Research in Time Awards, and FIRST Independent Research Support and Transition Awards.

†Including Centers Grants and Cooperative Agreement RFAs.

# NHLBI Competing Research Project Grant* Applications, Approvals, and Awards: Direct Cost for Fiscal Years 1980-1990



(Dollars in Millions)

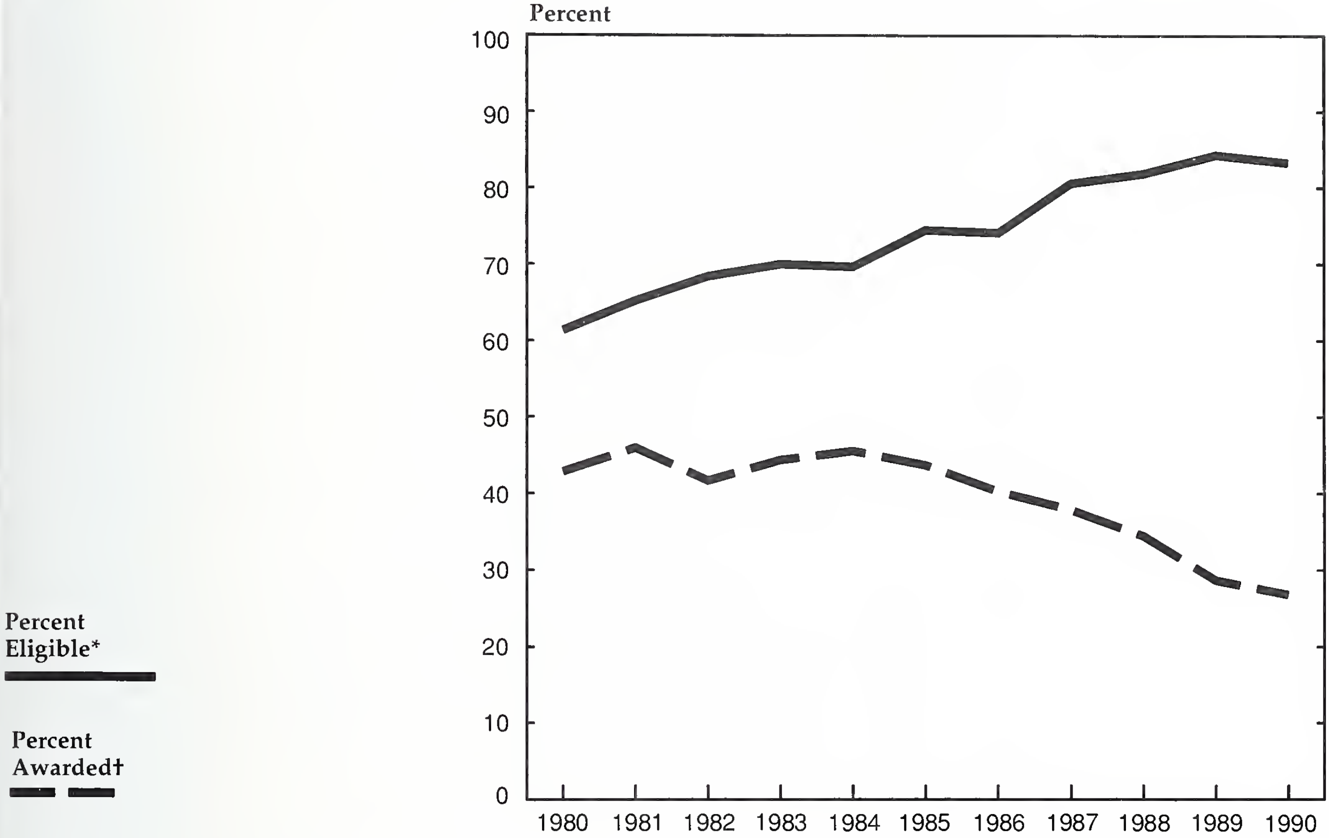
| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Current Year Requested | $187.4 | $208.0 | $248.0 | $266.3 | $263.9 | $343.0 | $366.7 | $402.1 | $433.2 | $432.9 | $443.4 |
| Current Year Approved | 114.4 | 135.2 | 169.5 | 186.1 | 183.6 | 254.7 | 268.8 | 323.6 | 354.5 | 364.3 | 368.2 |
| Eligible for Award† | 114.8 | 135.6 | 169.7 | 186.4 | 183.9 | 255.5 | 271.7 | 324.2 | 355.0 | 365.2 | 369.5 |
| Awarded | 49.3 | 62.4 | 70.7 | 82.7 | 83.9 | 111.6 | 109.5 | 122.9 | 122.4 | 104.7 | 99.3 |

*Includes R01, R23, P01, R43 (beginning in fiscal year 1983), R44 (beginning in fiscal year 1984), U01 (beginning in fiscal year 1985), R37 grants (beginning in fiscal year 1986), and R29 grants (beginning in fiscal year 1987).

†Includes unfunded approvals carried over from previous years that are funded within a specific year.

Source of Data: Division of Research Grants, NIH.

## NHLBI Competing Research Project Grant Applications: Percent of Dollars Funded, Fiscal Years 1980-1990

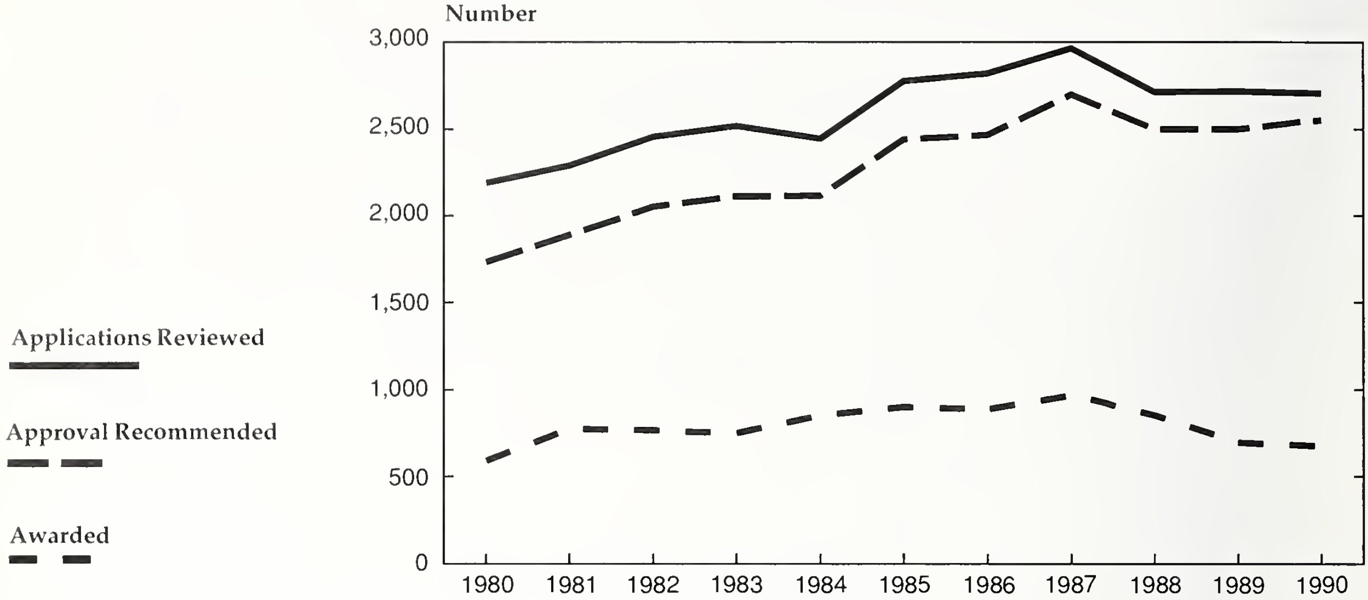


| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Percent of Regular Research Grant Applications Eligible for Award* | 61.3 | 65.2 | 68.4 | 70.0 | 69.7 | 74.5 | 74.1 | 80.6 | 81.9 | 84.3 | 83.3 |
| Percent of Those Eligible for Award Actually Awarded† | 42.9 | 46.0 | 41.7 | 44.4 | 45.6 | 43.7 | 40.3 | 37.9 | 34.5 | 28.7 | 26.8 |

*Dollar amount eligible for award/dollar amount requested in fiscal year, based on direct cost.

†Dollar amount awarded/dollar amount eligible for award, based on direct cost.

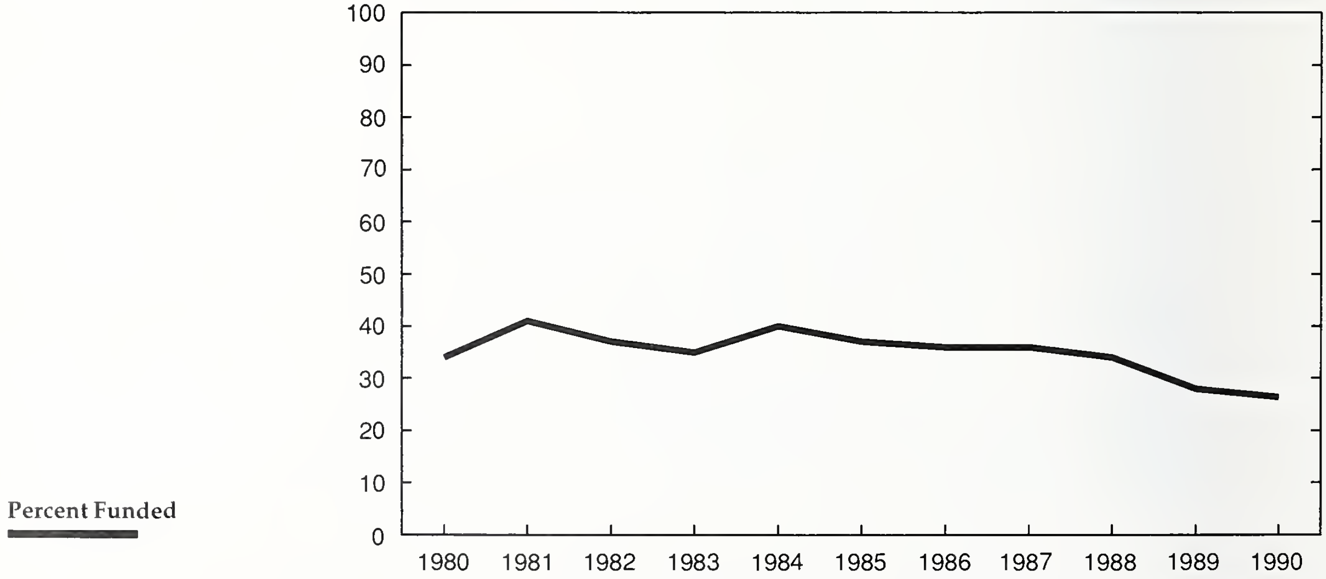
## NHLBI Competing Research Project Grants:* Applications Reviewed, Approval Recommended, and Awarded, Fiscal Years 1980-1990



Number of Grants

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| Current Year Applications Reviewed | 2,190 | 2,289 | 2,455 | 2,519 | 2,445 | 2,778 | 2,822 | 2,964 | 2,714 | 2,716 | 2,707 |
| Current Year Approvals Recommended | 1,735 | 1,890 | 2,054 | 2,110 | 2,115 | 2,441 | 2,467 | 2,699 | 2,500 | 2,498 | 2,551 |
| Total Eligible† | 1,741 | 1,897 | 2,055 | 2,114 | 2,119 | 2,448 | 2,481 | 2,706 | 2,505 | 2,504 | 2,556 |
| Awarded | 589 | 774 | 765 | 748 | 852 | 901 | 886 | 966 | 851 | 698 | 675 |

## NHLBI Competing Research Project Grants: Percent of Eligible Applications Funded, Fiscal Years 1980-1990



*Includes R01, R23, P01, R43 (beginning in fiscal year 1983), R44 (beginning in fiscal year 1984), U01 (beginning in fiscal year 1985), R37 (beginning in fiscal year 1986), and R29 grants (beginning in fiscal year 1987).

†Includes unfunded approvals carried over from previous years that were funded within a specific year.

Source: Division of Research Grants, NIH.

## NHLBI Research Project Grants (R01, P01, R23, R29, R37, R43, R44, U01):* Amount Funded by Type of Award, Fiscal Years 1980-1990

(Dollars in Millons)

| Fiscal Year | Total Noncompeting and Competing | Noncompeting | Competing | | | |
|---|---|---|---|---|---|---|
| | | | Total | New Competing | Renewal Competing | Competing Supplements |
| 1980 | 266.9 | 200.4 | 66.5 | 33.1 | 30.8 | 2.6 |
| 1981 | 289.1 | 202.6 | 86.5 | 40.2 | 43.5 | 2.8 |
| 1982 | 305.0 | 205.3 | 99.7 | 44.9 | 52.9 | 1.9 |
| 1983 | 356.8 | 239.8 | 117.0 | 57.0 | 57.8 | 2.2 |
| 1984 | 408.4 | 288.6 | 119.8 | 54.6 | 62.7 | 2.5 |
| 1985 | 479.2 | 321.0 | 158.2 | 86.3 | 67.2 | 4.7 |
| 1986 | 504.0 | 348.0 | 156.0 | 76.9 | 76.8 | 2.3 |
| 1987 | 576.3 | 397.9 | 178.4 | 83.5 | 90.8 | 4.1 |
| 1988 | 603.8 | 428.2 | 175.6 | 80.2 | 92.2 | 3.2 |
| 1989 | 658.4 | 508.7 | 149.7 | 77.5 | 70.5 | 1.7 |
| 1990 | 660.7 | 518.2 | 142.5 | 68.4 | 72.6 | 1.5 |

*R01 = Research Project Grants, P01 = Research Program Project Grants, R23 = New Investigator Research Grants.
R29 = FIRST Independent Research Support and Transition Awards (beginning in fiscal year 1987).
R37 = Method to Extend Research in Time (beginning in fiscal year 1986).
R43 = Small Business Innovation Research Grants Phase I (beginning in fiscal year 1983).
R44 = Small Business Innovation Research Grants Phase II (beginning in fiscal year 1984).
U01 = Cooperative Agreement (beginning in fiscal year 1985).

## Growth of Indirect Cost Rates of NHLBI Research Project Grants:* Fiscal Years 1970-1990

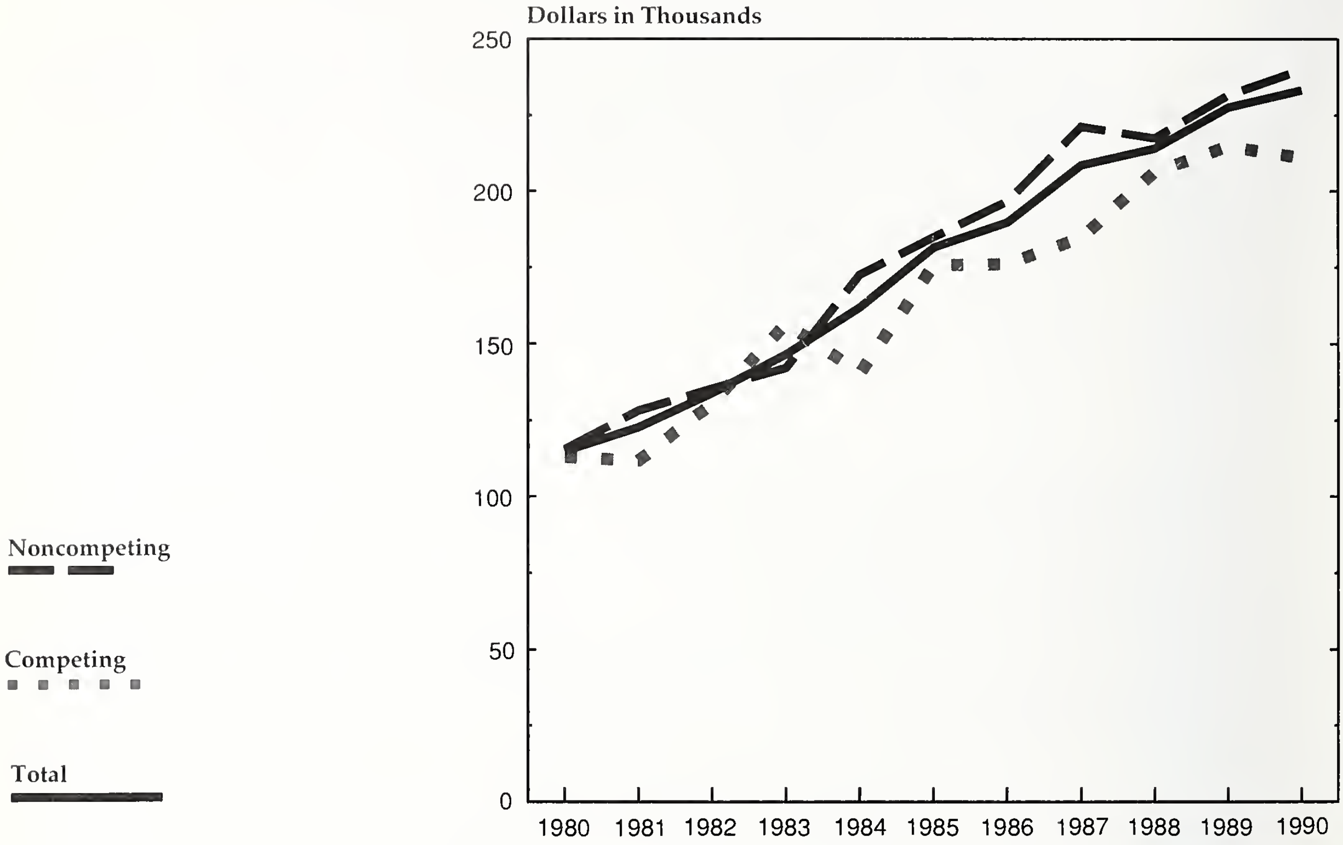
(Dollars in Thousands)

| Fiscal Year | Direct Cost | Indirect Cost | Indirect Cost as a Percent of Direct Cost | Total Cost |
|---|---|---|---|---|
| 1970 | 68,467 | 17,986 | 26.3 | 86,453 |
| 1971 | 72,021 | 20,021 | 27.8 | 92,042 |
| 1972 | 81,350 | 25,035 | 30.8 | 106,385 |
| 1973 | 86,540 | 27,674 | 32.0 | 114,214 |
| 1974 | 109,692 | 37,798 | 34.5 | 147,490 |
| 1975 | 97,205 | 34,828 | 35.8 | 132,033 |
| 1976† | 120,339 | 43,201 | 35.9 | 163,540 |
| 1977 | 137,493 | 49,872 | 36.3 | 187,365 |
| 1978 | 151,577 | 57,614 | 38.0 | 209,191 |
| 1979 | 182,263 | 71,215 | 39.1 | 253,478 |
| 1980 | 190,113 | 76,783 | 40.2 | 266,896 |
| 1981 | 203,968 | 85,083 | 41.7 | 289,051 |
| 1982 | 212,982 | 92,050 | 43.2 | 305,032 |
| 1983 | 245,296 | 111,508 | 45.5 | 356,804 |
| 1984 | 279,094 | 129,292 | 46.3 | 408,386 |
| 1985 | 326,743 | 152,422 | 46.6 | 479,165 |
| 1986 | 345,728 | 158,284 | 45.8 | 504,012 |
| 1987 | 394,555 | 181,784 | 46.1 | 576,340 |
| 1988 | 415,471 | 188,390 | 45.3 | 603,861 |
| 1989 | 452,557 | 205,831 | 45.5 | 658,388 |
| 1990 | 450,497 | 210,225 | 46.7 | 660,722 |

*Includes Regular Project Grants, Program Project Grants, New Investigator Awards, Small Business Innovation Research Grants, Cooperative Agreements, Method to Extend Research in Time Awards, and FIRST Independent Research Support and Transition Awards.

†Excludes Transition Quarter.

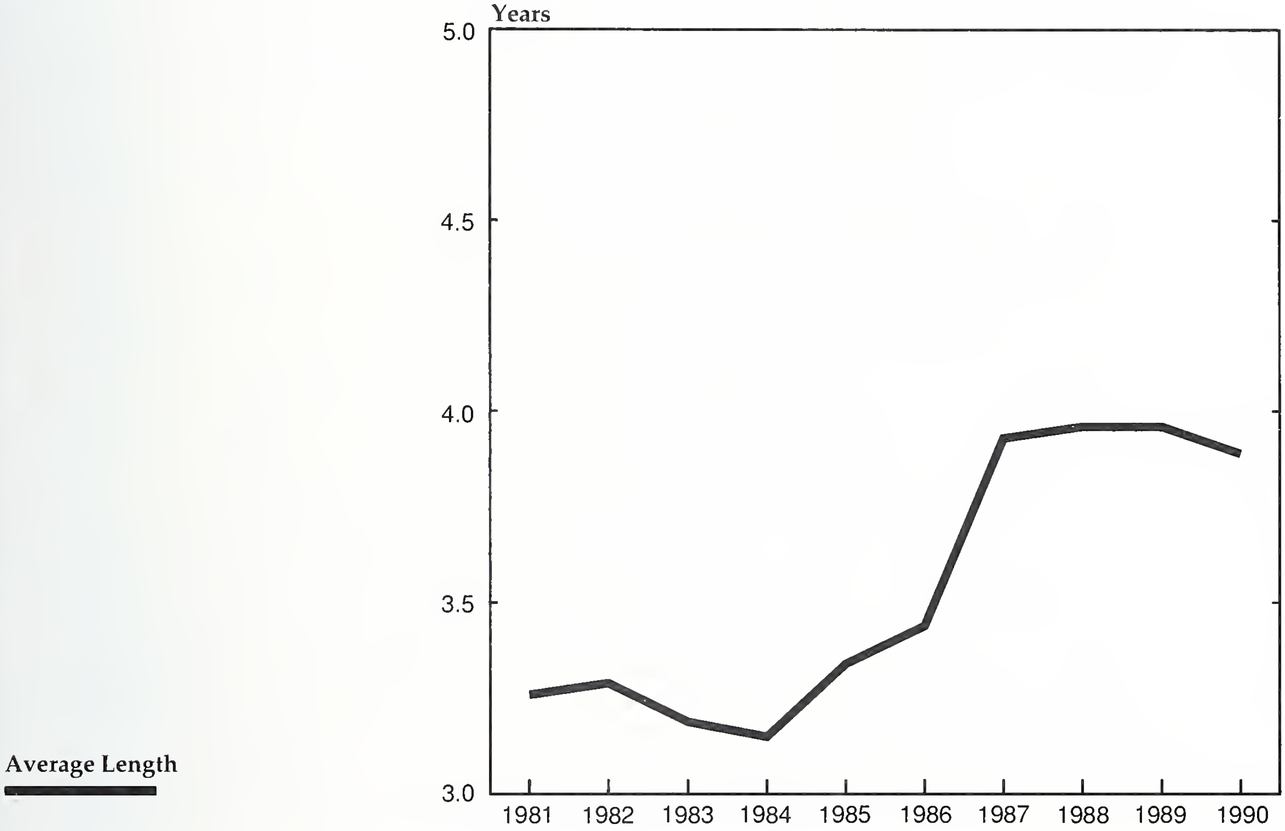
## NHLBI Research Project Grants: Average Cost, Fiscal Years 1980-1990



**(Dollars in Thousands)**

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| Noncompeting | $115.5 | $128.0 | $135.3 | $142.0 | $172.4 | $184.8 | $196.6 | $221.1 | $217.2 | $231.5 | 239.9 |
| Competing | 112.9 | 111.7 | 130.4 | 156.4 | 140.6 | 175.6 | 176.0 | 184.7 | 206.4 | 214.5 | 211.1 |
| **Total** | **$114.8** | **$122.7** | **$133.7** | **$146.4** | **$161.7** | **$181.6** | **$189.8** | **$208.4** | **$214.0** | **$227.4** | **233.1** |

## NHLBI Competing Grants:* Average Length of Grants, Fiscal Years 1981-1990

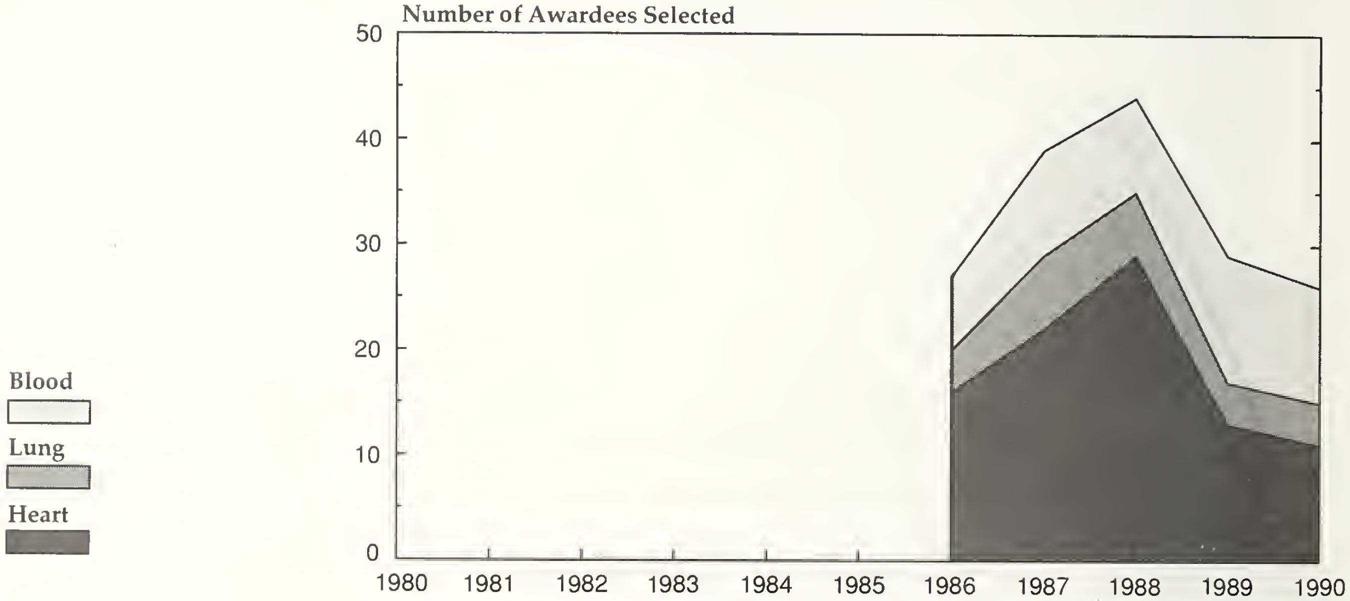


| | Fiscal Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Average Length (in years) | 3.26 | 3.29 | 3.19 | 3.15 | 3.34 | 3.44 | 3.93 | 3.96 | 3.96 | 3.89 |

*Excludes supplements.

## NHLBI MERIT Award Program (R37): Number of New Awardees Selected, Fiscal Years 1980-1990

The Method to Extend Research in Time (MERIT) Award program was initiated by the National Heart, Lung, and Blood Institute in FY 1986. The objective of the MERIT Award is to provide long-term, stable support to investigators whose research competence and productivity are distinctly superior and who are likely to continue to perform in an outstanding manner. The provision of long-term, stable support to such investigators is intended to foster their continued creativity and lessen the administrative burdens associated with preparation and submission of research grant applications.

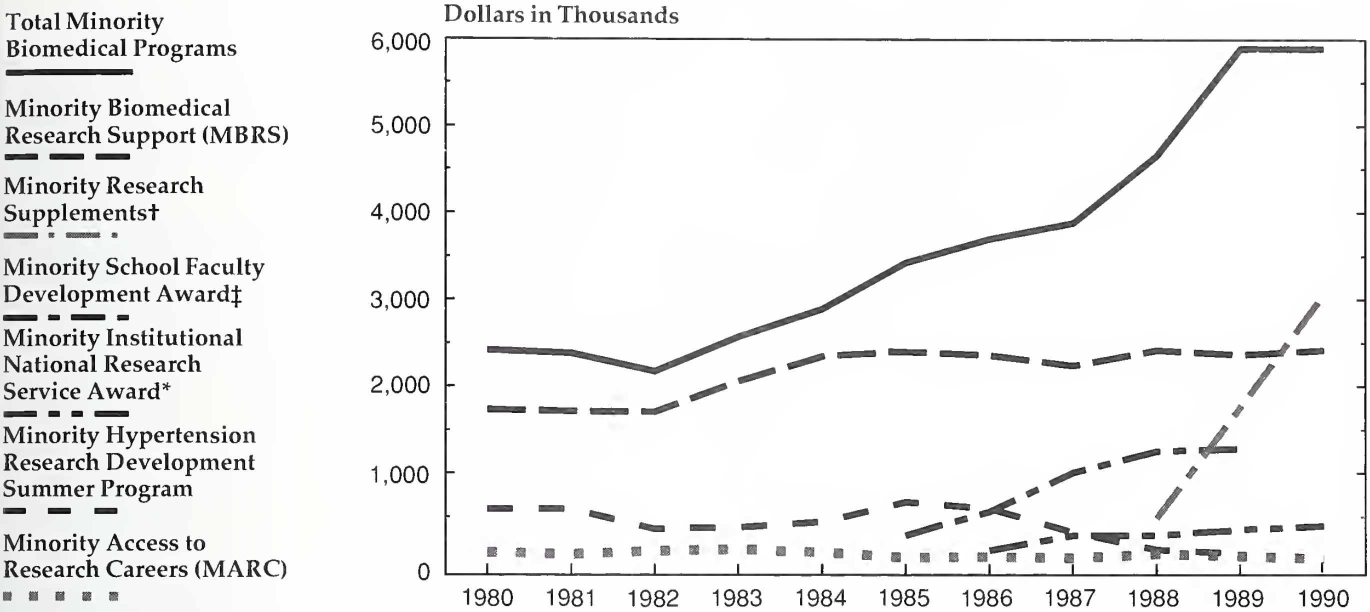


(Number of Awardees Selected)

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986* | 1987 | 1988 | 1989 | 1990 |
| Heart | — | — | — | — | — | — | 16 | 22 | 29 | 13 | 11 |
| Lung | — | — | — | — | — | — | 4 | 7 | 6 | 4 | 4 |
| Blood | — | — | — | — | — | — | 7 | 10 | 9 | 12 | 11 |
| **Total** | **—** | **—** | **—** | **—** | **—** | **—** | **27** | **39** | **44** | **29** | **26** |

*First MERIT Awardees selected in FY 1986.

## NHLBI Minority Biomedical Program Obligations: Fiscal Years 1980-1990



*Beginning in fiscal year 1986. †Beginning in fiscal year 1988. ‡Beginning in fiscal year 1985.

## NHLBI Minority Biomedical Program Obligations, Fiscal Years 1980-1990

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Minority Biomedical Research Support (MBRS) | $1,737,586 | $1,716,545 | $1,708,300 | $2,058,010 | $2,347,939 | $2,399,223 | $2,353,924 | $2,241,430 | $2,415,511 | $2,368,485 | $2,418,000 |
| Minority Access to Research Careers (MARC) | 89,504 | 71,613 | 110,246 | 132,890 | 95,077 | 33,948 | 42,437 | 26,337 | 67,337 | 51,905 | 34,020 |
| Minority Hypertension Research Development Summer Program | 585,126 | 590,856 | 355,321 | 381,978 | 443,192 | 672,837 | 598,396 | 320,212 | 125,596 | 79,895 | 0 |
| Minority Pulmonary Research Development Summer Program | — | — | — | — | — | 33,006 | 27,783 | 1,908 | 24,587 | 0 | 0 |
| Minority Institutional National Research Service Award | — | — | — | — | — | — | 115,125 | 282,634 | 287,653 | 348,213 | 398,435 |
| Minority School Faculty Development Award | — | — | — | — | — | 283,625 | 557,987 | 1,011,683 | 1,256,433 | 1,280,391 | 1,188,976 |
| Minority Research Supplements Program | — | — | — | — | — | — | — | — | 484,669 | 1,762,525 | 3,059,028 |
| **Total, Minority Programs** | **$2,412,216** | **$2,379,014** | **$2,173,867** | **$2,572,878** | **$2,886,208** | **$3,422,639** | **$3,695,652** | **$3,884,204** | **$4,661,786** | **$5,891,414** | **$7,098,459** |

## NHLBI Specialized Centers of Research (SCOR) (P50 and P60) Program, Initiated in Fiscal Year 1971

Specialized Centers of Research were instituted to advance basic knowledge and to generate the most effective techniques and methods of clinical management and prevention in the areas of arteriosclerosis, hypertension, pulmonary diseases, and thrombosis. Currently, the SCOR Program focuses on 12 areas of heart, blood vessel, lung, and blood research.

| | | Obligations (Dollars in Thousands) | | |
|---|---|---|---|---|
| **Areas of Concentration** | **Period of Operation** | **Prior to FY 1990*** | **FY 1990** | **Total To Date*** |
| Adult Respiratory Failure | 1978- | $ 31,140 | $ 4,055 | $ 35,195 |
| Arteriosclerosis | 1971- | 227,718 | 14,622 | 242,340 |
| Chronic Diseases of the Airways | 1977- | 39,424 | 4,958 | 44,382 |
| Hypertension | 1971- | 109,998 | 12,040 | 122,038 |
| Coronary and Peripheral Vascular Diseases, Heart Failure, and Congenital Heart Disease† | 1975- | 192,123 | 14,177 | 206,300 |
| Occupational and Immunologic Lung Diseases | 1977- | 45,092 | 4,371 | 49,463 |
| Pulmonary Diseases | 1971-1976 | 44,993 | — | 44,993 |
| Pulmonary Vascular Diseases | 1977- | 24,779 | 1,963 | 26,742 |
| Respiratory Disorders of Neonates and Children | 1977- | 70,817 | 6,106 | 76,923 |
| Cystic Fibrosis | 1988- | 3,583 | 1,860 | 5,443 |
| Cardiopulmonary Disorders During Sleep | 1988- | 2,743 | 1,689 | 4,432 |
| Thrombosis | 1971- | 78,970 | 5,926 | 84,896 |
| Transfusion Medicine | 1985- | 12,677 | 1,718 | 14,395 |
| **Total, NHLBI** | | **$884,057** | **$73,485** | **$957,542** |

*Excludes Transition Quarter, 1976.
†Formerly "Ischemic Heart Disease."

## Adult Respiratory Failure

In four SCORs, researchers are conducting studies on biochemical, immunologic, and physiologic mechanisms of acute lung injury and repair in order to improve the diagnosis, management, and prevention of adult respiratory distress syndrome.

### Obligations

Fiscal Year 1990—$4,054,804

### Current Active Organizations and Grant Numbers

| | |
|---|---|
| 1. University of California, San Diego, La Jolla, California | —HL23584 |
| 2. University of Washington, Seattle, Washington | —HL30542 |
| 3. St. Louis University, St. Louis, Missouri | —HL30572 |
| 4. University of Colorado Health Sciences Center, Denver, Colorado | —HL40784 |

## Arteriosclerosis

In seven SCORs, researchers are involved in the study of hyperlipidemia and vascular diseases, including animal and tissue studies and basic laboratory investigations.

### Obligations

Fiscal Year 1990—$14,621,886

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | Bowman Gray School of Medicine,<br>Wake Forest University,<br>Winston-Salem, North Carolina | —HL14164 |
| 2. | University of California, San Diego,<br>La Jolla, California | —HL14197 |
| 3. | University of Iowa,<br>Iowa City, Iowa | —HL14230 |
| 4. | University of California,<br>San Francisco, California | —HL14237 |
| 5. | University of Chicago,<br>Chicago, Illinois | —HL15062 |
| 6. | Columbia University,<br>New York, New York | —HL21006 |
| 7. | Baylor College of Medicine,<br>Houston, Texas | —HL27341 |

## Chronic Diseases of the Airways

In four SCORs, studies are directed at problems associated with the conduct of basic, applied, and clinical research projects for chronic airway diseases such as emphysema, chronic bronchitis, and asthma.

### Obligations

Fiscal Year 1990—$4,958,174

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | University of Arizona,<br>Tucson, Arizona | —HL14136 |
| 2. | Harvard University,<br>Boston, Massachusetts | —HL19170 |
| 3. | Case Western Reserve University,<br>Cleveland, Ohio | —HL37117 |
| 4. | The Johns Hopkins University,<br>Baltimore, Maryland | —HL37119 |

## Hypertension

In six SCORs, scientists study the etiology and pathogenesis of hypertension and are developing and applying new knowledge for the improved diagnosis and management of the disease.

### Obligations

Fiscal Year 1990—$12,039,516

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | Vanderbilt University School of Medicine, Nashville, Tennessee | —HL14192 |
| 2. | Boston University, Boston, Massachusetts | —HL18318 |
| 3. | Cornell University Medical School, New York, New York | —HL18323 |
| 4. | University of Alabama, Birmingham, Alabama | —HL35051 |
| 5. | Brigham and Women's Hospital, Inc., Boston, Massachusetts | —HL36568 |
| 6. | University of Southern California, Los Angeles, California | —HL44404 |
| 7. | University of Iowa, Iowa City, Iowa | —HL44546 |

## Coronary and Peripheral Vascular Diseases, Heart Failure, and Congenital Heart Disease

Seven SCORs conduct multidisciplinary studies of ischemic heart disease (IHD), and there is one SCOR focusing on peripheral vascular disease (PVD), one investigating heart failure (HF), and one studying congenital heart disease (CHD). All centers cover the spectrum of research from basic to clinical investigations.

### Obligations

Fiscal Year 1990—$14,177,236

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | Washington University, St. Louis, Missouri (IHD) | —HL17646 |
| 2. | The Johns Hopkins University, Baltimore, Maryland (IHD) | —HL17655 |
| 3. | University of Alabama, Birmingham, Alabama (IHD) | —HL17667 |
| 4. | University of Texas, Southwestern Medical School, Dallas, Texas (IHD) | —HL17669 |
| 5. | Duke University, Durham, North Carolina (IHD) | —HL17670 |
| 6. | University of California at San Diego, La Jolla, California (IHD) | —HL17682 |
| 7. | University of Iowa, Iowa City, Iowa (IHD) | —HL32295 |
| 8. | University of Iowa, Iowa City, Iowa (CHD) | —HL42266 |
| 9. | Baylor College of Medicine Houston, Texas (HF) | —HL42267 |
| 10. | University of Washington Seattle, Washington (PVD) | —HL42270 |

## Occupational and Immunologic Lung Diseases

Researchers in four SCORs are examining the role of inflammation and cellular and humoral immune activities in interstitial pulmonary fibrosis, including that which results from environmental or occupational exposure.

### Obligations

Fiscal Year 1990—$4,370,548

### Current Active Organizations and Grant Numbers

| | |
|---|---|
| 1. University of Vermont, Burlington, Vermont | —HL14212 |
| 2. Tulane University, New Orleans, Louisiana | —HL15092 |
| 3. National Jewish Center for Immunology and Respiratory Medicine, Denver, Colorado | —HL27353 |
| 4. University of Iowa, Iowa City, Iowa | —HL37121 |

## Pulmonary Vascular Diseases

Researchers in two SCORs focus on basic and clinical research in pulmonary hypertension, cor pulmonale, and pulmonary edema.

### Obligations

Fiscal Year 1990—$1,963,487

### Current Active Organizations and Grant Numbers

| | |
|---|---|
| 1. Vanderbilt University, Nashville, Tennessee | —HL19153 |
| 2. University of California, San Francisco, California | —HL19155 |

## Respiratory Disorders of Neonates and Children

In six SCORs, research is emphasizing basic and clinical research on neonatal respiratory diseases, cystic fibrosis, and bronchiolitis.

### Obligations

Fiscal Year 1990—$6,106,228

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | Vanderbilt University School of Medicine, Nashville, Tennessee | —HL14214 |
| 2. | University of North Carolina, Chapel Hill, North Carolina | —HL19171 |
| 3. | University of California, San Francisco, California | —HL27356 |
| 4. | Brigham and Women's Hospital, Inc., Boston, Massachusetts | —HL34616 |
| 5. | Southwest Foundation for Biomedical Research, San Antonio, Texas | —HL36536 |
| 6. | University of Rochester, Rochester, New York | —HL36543 |

## Cystic Fibrosis

Research in three SCORs emphasizes the exploration of basic mechanisms underlying cystic fibrosis, the elaboration of new hypotheses, and the generation of innovative strategies for approaching clinical and fundamental issues.

### Obligations

Fiscal Year 1990—$1,860,078

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | University of California, San Francisco, California | —HL42368 |
| 2. | University of North Carolina, Chapel Hill, North Carolina | —HL42384 |
| 3. | University of Iowa, Iowa City, Iowa | —HL42385 |

## Cardiopulmonary Disorders During Sleep

In two SCORs, basic and clinical research focuses on the pathogenesis, diagnosis, and management of cardiopulmonary disorders during sleep.

### Obligations

Fiscal Year 1990—$1,688,675

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | Case Western Reserve University, Cleveland, Ohio | —HL42215 |
| 2. | University of Pennsylvania, Philadelphia, Pennsylvania | —HL42236 |

## Thrombosis

In four SCORs involved with blood diseases, scientists are emphasizing research defining the pathogenic mechanisms of human thrombotic disease and methods for its diagnosis and treatment.

### Obligations

Fiscal Year 1990—$5,925,521

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | Washington University, St. Louis, Missouri | —HL14147 |
| 2. | Cornell University Medical School, New York, New York | —HL18828 |
| 3. | University of North Carolina, Chapel Hill, North Carolina | —HL26309 |
| 4. | University of Vermont, Burlington, Vermont | —HL35058 |

## Transfusion Medicine

Three Transfusion Medicine SCORs have been established to foster new approaches for improving the availability, efficacy, safety, and quality of blood and blood products for therapeutic uses.

### Obligations

Fiscal Year 1990—$1,718,026

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | Center for Blood Research,<br>Boston, Massachusetts | —HL33774 |
| 2. | Puget Sound Blood Center,<br>Seattle, Washington | —HL33775 |
| 3. | Stanford University Blood Center,<br>Stanford, California | —HL33811 |

## Comprehensive Sickle Cell Centers (P60) Program Initiated in Fiscal Year 1972

In these centers, the gap between research and service is bridged, and basic and clinical research, clinical trials and application, training, and community service projects are combined.

### Obligations

Fiscal Year 1990—$14,897,741

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | Boston City Hospital,<br>Boston, Massachusetts | —HL15157 |
| 2. | Children's Hospital,<br>Cincinnati, Ohio | —HL15996 |
| 3. | Wayne State University,<br>Detroit, Michigan | —HL16008 |
| 4. | University of California,<br>San Francisco, California | —HL20985 |
| 5. | College of Physicians and Surgeons of<br>Columbia University,<br>New York, New York | —HL28381 |
| 6. | Duke University,<br>Durham, North Carolina | —HL28391 |
| 7. | Children's Hospital of Philadelphia,<br>Philadelphia, Pennsylvania | —HL38632 |
| 8. | University of South Alabama,<br>Mobile, Alabama | —HL38639 |
| 9. | Montefiore Medical Center,<br>New York, New York | —HL38655 |
| 10. | Meharry Medical College,<br>Nashville, Tennessee | —HL38737 |

## NHLBI Research, Demonstration, and Education Program (R18)

Research, demonstration, and education projects test the effectiveness of interventions to promote health or prevent disease in defined populations. The interventions selected are those that already have been found to be efficacious in other studies.

| Program | Obligations Prior to FY 1990 | FY 1990 Obligations | Total Obligations to Date* |
|---|---|---|---|
| **Heart and Vascular Diseases** | | | |
| Institute-Initiated (RFA) | $13,750,908 | 0 | $13,750,908 |
| Investigator-Initiated | 9,563,749 | 0 | 9,563,749 |
| Subtotal | $23,314,657 | 0 | $23,314,657 |
| **Lung Diseases** | | | |
| Institute-Initiated (RFA) | 4,615,615 | 0 | 4,615,615 |
| Investigator-Initiated | $2,871,917 | 14,450 | 2,886,367 |
| Subtotal | $7,487,532 | $14,450 | $7,501,982 |
| **Blood Diseases and Resources** | | | |
| Institute-Initiated (RFA) | 503,411 | 0 | 503,411 |
| Investigator-Initiated | 4,501,238 | 605,000 | 5,106,238 |
| Subtotal | $5,004,649 | $605,000 | $5,609,649 |
| Subtotal, NHLBI | | | |
| Institute-Initiated | 18,869,934 | 0 | 18,869,934 |
| Investigator-Initiated | 16,936,904 | 619,450 | 17,556,354 |
| **Total, NHLBI** | **$35,806,838** | **$619,450** | **$36,426,288** |

*September 30, 1990.

### Obligations

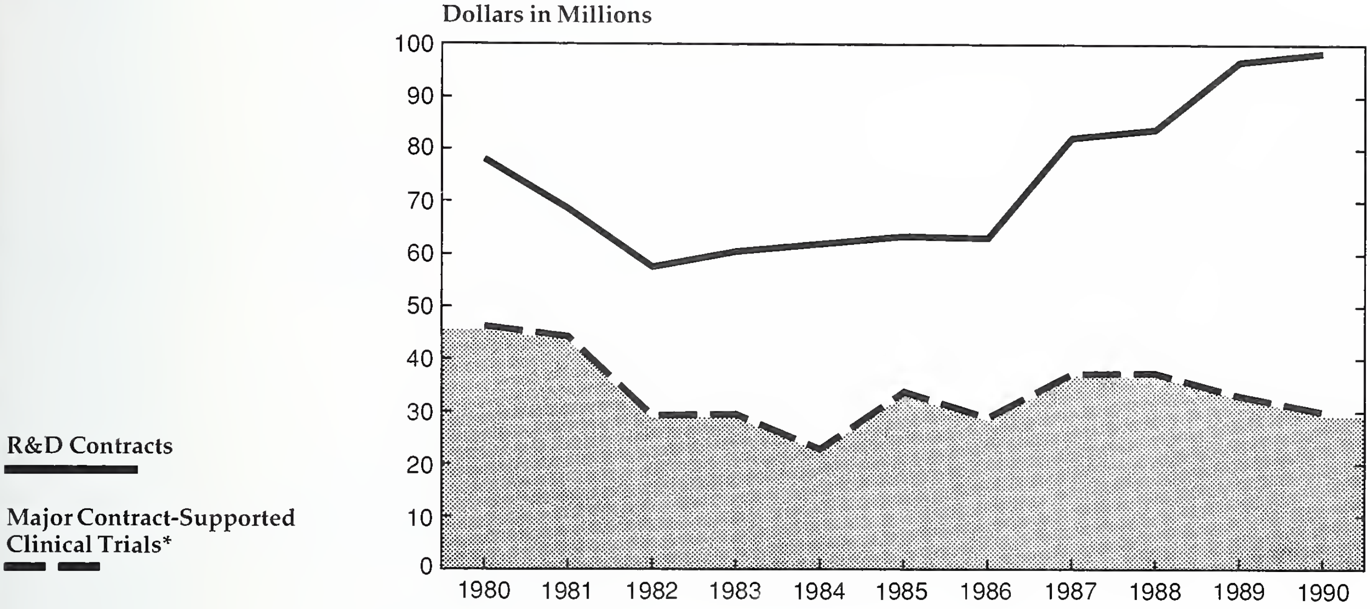
Fiscal Year 1990—$619,450

### Current Active Organizations and Grant Numbers

| Organization | Grant Number |
|---|---|
| 1. University of North Carolina, Chapel Hill, North Carolina | —HL28895 |
| 2. Puget Sound Blood Center, Seattle, Washington | —HL45265 |

# 11. Research and Development Contracts

## NHLBI Research and Development Contract Obligations,* Fiscal Years 1980-1990



*Prior to FY 1984, excludes intramural contracts and research management and support contracts. For detailed data on contract-supported clinical trials, see Chapter 12.

## NHLBI Research and Development Contract Obligations, Fiscal Years 1980-1990

(Dollars in Thousands)

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Heart | $66,941 | $60,517 | $47,325 | $52,034 | $48,196 | $39,626 | $48,430 | $53,389 | $61,342 | $63,944 | $62,177 |
| Lung | 4,818 | 3,388 | 3,289 | 3,176 | 2,616 | 11,329 | 6,201 | 12,183 | 6,122 | 9,169 | 10,338 |
| Blood | 6,232 | 4,657 | 6,927 | 5,232 | 11,150 | 12,482 | 8,384 | 16,693 | 16,408 | 23,607 | 25,862 |
| **Total** | **$77,991** | **$68,562** | **$57,541** | **$60,442** | **$61,962** | **$63,437** | **$63,015** | **$82,265** | **$83,872** | **96,720** | **98,377** |

## Major NHLBI Research and Development Contracts, Fiscal Year 1990: By Program*

| | Total Obligations Prior to FY 1990 | Total FY 1990 Obligations | Total Obligations to Date |
|---|---|---|---|
| **Heart and Vascular Diseases** | | | |
| Circulatory Assist/Artificial Heart Program | $38,868,196 | $6,604,544 | $45,472,740 |
| Coronary Artery Risk Development in Young Adults (CARDIA) | 15,752,481 | 5,970,067 | 21,722,548 |
| NHLBI Growth and Health Study | 7,927,860 | 1,977,365 | 9,905,225 |
| Atherosclerosis Risk in Communities (ARIC) | 29,861,640 | 7,684,538 | 37,546,178 |
| Cardiovascular Health Study | 11,212,006 | 4,453,000 | 15,665,006 |
| Nonhuman Primate Resource Program | 9,370,692 | 2,661,813 | 12,032,505 |
| Honolulu Heart Program | 12,417,291 | 2,540,130 | 14,957,421 |
| **Blood Diseases and Resources** | | | |
| Non-A, Non-B Prospective Study | 1,942,730 | 786,537 | 2,729,267 |
| National Marrow Donor Program | 1,500,000 | 3,600,000 | 5,100,000† |
| Transfusion Safety Study | 34,985,230 | 10,240,000 | 45,225,230 |
| **Lung Diseases** | | | |
| Pulmonary Complications of AIDS | 4,933,000 | 2,013,000 | 6,946,000 |
| Pediatric Lung and Heart Complications of HIV Infection | 1,630,000 | 4,182,146 | 5,812,146 |

*Excludes clinical trials included in Chapter 12. Selected programs described below.

†Additional $2,500,000 provided by the Department of the Navy by means of reimbursable agreement.

## Circulatory Assist/Artificial Heart Program: Heart and Vascular Diseases Program

This program focuses on mechanical circulatory support systems: ventricular assist devices and the total artificial heart. The basic research underlying this program is supported by research grants. Device development and clinical testing of devices are supported by contract.

### Obligations

Funding History:
Fiscal Year 1990—$6,604,544
Fiscal Years 1984-1989—$38,868,196
Total Funding to Date—$45,472,740

### Current Active Organizations and Contract Numbers

**Fabrication and Clinical Testing, Initiated in Fiscal Year 1989:**

| | Organization | Contract |
|---|---|---|
| 1. | University of Pittsburgh, Pittsburgh, Pennsylvania | —HV-0-8109 |
| 2. | St. Louis University Medical Center, St. Louis, Missouri | —HV-0-8113 |
| 3. | Baxter Health Care Corp., Oakland, California | —HV-9-8107 |

**Biventricular Assist and Replacement Devices, Initiated in Fiscal Year 1988:**

| | Organization | Contract |
|---|---|---|
| 1. | Cleveland Clinic Foundation, Cleveland, Ohio | —HV-8-8103 |
| 2. | Applied Biomedical Corporation (ABIOMED), Danvers, Massachusetts | —HV-8-8104 |
| 3. | Pennsylvania State University, Hershey, Pennsylvania | —HV-8-8105 |
| 4. | University of Utah, Salt Lake City, Utah | —HV-8-8106 |
| 5. | New England Research Institute, Watertown, Massachusetts | —HV-0-8111 |

## Coronary Artery Risk Development in Young Adults (CARDIA): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1984

CARDIA is a prospective epidemiologic investigation of the precursors and determinants of coronary heart disease (CHD) risk factors and their evolution over time in a biracial cohort of young men and women (ages 18-30 years). The principal objectives of the study are to measure the prevalence and distribution, in this population, of risk factors related to the development of CHD in older cohorts and to identify lifestyles that influence changes in risk factors.

### Obligations

Funding History:
Fiscal Year 1990—$5,970,067
Fiscal Years 1984-1989—$15,752,481
Total Funding to Date—$21,722,548

### Current Active Organizations and Contract Numbers

| | Organization | Contract Number |
|---|---|---|
| 1. | University of Alabama, Birmingham, Alabama | —HC-4-8047 |
| 2. | University of Minnesota, Minneapolis, Minnesota | —HC-4-8048 |
| 3. | Northwestern University, Evanston, Illinois | —HC-4-8049 |
| 4. | Kaiser Foundation Research Institute, Oakland, California | —HC-4-8050 |
| 5. | University of Alabama, Birmingham, Alabama | —HC-9-5095 |
| 6. | University of California, Irvine, California | —HC-9-5100 |

## NHLBI Growth and Health Study (NGHS): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1985

This program is investigating the occurrence of obesity in young women, predictors of transition to the obese state, correlates of this transition, and relationship of this transition to other coronary heart disease risk factors.

### Obligations

Funding History:
Fiscal Year 1990—$1,977,365
Fiscal Years 1985-1989—$7,927,860
Total Funding to Date—$9,905,225

### Current Active Organizations and Contract Numbers

| | Organization | Contract Number |
|---|---|---|
| 1. | Maryland Medical Research Institute, Baltimore, Maryland | —HC-5-5023 |
| 2. | University of California, Berkeley, California | —HC-5-5024 |
| 3. | University of Cincinnati, Cincinnati, Ohio | —HC-5-5025 |
| 4. | Westat, Inc., Rockville, Maryland | —HC-5-5026 |

## Atherosclerosis Risk in Communities (ARIC): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1985

ARIC is a large-scale, long-term program that is measuring associations of established and suspected coronary heart disease (CHD) risk factors with both atherosclerosis and new CHD events in men and women from four diverse communities. The project has two components: community surveillance and repeated examinations of a representative cohort of men and women in each community.

### Obligations

Funding History:
Fiscal Year 1990—$7,684,538
Fiscal Years 1985-1989—$29,861,640
Total Funding to Date—$37,546,178

### Current Active Organizations and Contract Numbers

| | | |
|---|---|---|
| 1. | University of North Carolina, Chapel Hill, North Carolina | —HC-5-5015 |
| 2. | Baylor College of Medicine, Houston, Texas | —HC-5-5016 |
| 3. | University of North Carolina, Chapel Hill, North Carolina | —HC-5-5018 |
| 4. | University of Minnesota, Minneapolis, Minnesota | —HC-5-5019 |
| 5. | The Johns Hopkins University, Baltimore, Maryland | —HC-5-5020 |
| 6. | Mississippi Medical Center, Jackson, Mississippi | —HC-5-5021 |
| 7. | Texas Health Science Center at Houston, Houston, Texas | —HC-5-5022 |

## Cardiovascular Health Study (CHS): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1988*

The major objective of this research is to investigate risk factors for coronary heart disease and stroke in the elderly, including the factors associated with preclinical cardiovascular diseases and the social and psychologic circumstances surrounding a cardiovascular event.

### Obligations

Funding History:
Fiscal Year 1990—$4,453,000
Fiscal Year 1988-1989—$11,212,006
Total Funding to Date—$15,665,006

### Current Active Organizations and Contract Numbers

| | | |
|---|---|---|
| 1. | University of Washington, Seattle, Washington | —HC-8-5079 |
| 2. | Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, North Carolina | —HC-8-5080 |
| 3. | The Johns Hopkins University, Baltimore, Maryland | —HC-8-5081 |
| 4. | University of Pittsburgh, Pittsburgh, Pennsylvania | —HC-8-5082 |
| 5. | University of California, Davis, California | —HC-8-5083 |
| 6. | University of California, Irvine, California | —HC-8-5084 |
| 7. | New England Deaconess Hospital, Boston, Massachusetts | —HC-8-5085 |
| 8. | Vermont University, Burlington, Vermont | —HC-8-5086 |

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*Formerly called "Coronary Heart Disease and Stroke in the Elderly Program."

## Non-A, Non-B Prospective Study: Blood Diseases and Resources Program, Initiated in Fiscal Year 1988

This contract supports a natural history study of chronic Non-A, Non-B (NANB) hepatitis. The five-year, retrospective-prospective epidemiologic study involves a group of patients with documented NANB post-transfusion hepatitis (PTH) as well as a group of transfusion recipients who have not acquired NANB PTH. The objective of the study is to obtain clinical, biochemical, and histologic information on the two patient groups.

### Obligations

Funding History:
Fiscal Year 1990—$786,537
Fiscal Year 1988-1989—$1,942,730
Total Funding to Date—$2,729,267

### Current Active Organization* and Contract Number

| | |
|---|---|
| 1. Georgetown University, Washington, D.C. | —HB-8-7047 |

## National Marrow Donor Program: Blood Diseases and Resources Program, Initiated in Fiscal Year 1989

This program, which was transferred from the Department of the Navy (Navy Marrow Donor Registry) to the NHLBI in fiscal year 1989, serves as a focal point for bone marrow research. It includes a national registry of volunteers who have offered to donate marrow for transplant to patients not having suitably matched relatives.

### Obligations

Funding History:
Fiscal Year 1990—$3,600,000
Fiscal Year 1989—$1,500,000
Total Funding to Date*—$5,100,000

### Current Active Organizations and Contract Numbers

| | |
|---|---|
| 1. American National Red Cross, Washington, D.C. | —HB-9-7075 |
| 2. Puget Sound Blood Center, Seattle, Washington | —HB-9-7084 |

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*This program operates through 13 clinical centers throughout the country.

*Additional $2,500,000 was provided by the Department of the Navy by means of reimbursable agreement.

# 12. Clinical Trials

A clinical trial is defined as a scientific research study undertaken with human subjects to evaluate prospectively the diagnostic, prophylactic, or therapeutic effect of a drug, device, regimen, or procedure used or intended ultimately for use in the practice of medicine or the prevention of disease. A clinical trial is planned and conducted prospectively and includes a concurrent control group or other appropriate comparison group.

## NHLBI Investigator-Initiated Clinical Trials: Fiscal Years 1980-1990

Research Grants (Dollars in Thousands)

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| **Heart and Vascular Diseases** | | | | | | | | | | | |
| Program on Surgical Control of Hyperlipidemias (POSCH) | $4,097 | $4,601 | $5,024 | $3,249 | $2,580 | $3,344 | $2,998 | $3,405 | $3,175 | $2,394 | $1,902 |
| Management of Patent Ductus in Premature Infants | 1,435 | 577 | — | — | — | — | — | — | — | — | — |
| Prevention of Hypertension: Randomized Trial | 196 | 215 | 239 | 240 | 262 | 328 | 271 | — | — | — | — |
| Exercise Training and Plasma Lipoproteins in Man | 98 | — | 394 | 534 | 561 | 627 | 1,025 | 1,203 | 808 | 621 | — |
| Platelet Drug Trial in Coronary Disease Progression | 123 | 159 | 75 | 289 | 291 | 263 | 301 | 293 | — | — | — |
| Control of Hypertension by Non-Pharmacologic Means | 369 | 444 | 417 | 427 | 518 | 91 | — | — | — | — | — |
| Dietary Intervention Study for Hypertension (DISH) | 1,154 | 1,471 | 1,096 | — | — | — | — | — | — | — | — |
| Systolic Hypertension in Elderly Program (SHEP) Pilot Study | 966 | 1,070 | 854 | 909 | 1,138 | 327 | 85 | — | — | — | — |
| Hypertension Prevention Trial | — | 1,121 | 2,634 | 2,290 | 2,483 | 1,913 | 886 | 908 | — | — | — |
| Physicians' Health Study | — | 506 | — | 416 | 530 | 637 | 590 | 614 | 613 | 655 | 645 |
| Evaluation of SC-V Versus Conventional CPR | — | 342 | 308 | 290 | — | — | — | — | — | — | — |
| Non-Surgical Reperfusion of Coronary Arteries | — | — | 1,066 | 1,122 | 1,496 | 346 | 300 | — | — | — | — |
| Effect of Increased Dietary Potassium on Blood Pressure | — | — | — | 267 | 313 | 318 | 342 | 162 | — | — | — |
| Cardiovascular System in Obesity | — | — | — | 211 | 228 | 271 | 278 | — | — | — | — |
| Intravenous Streptokinase in Acute Myocardial Infarction | — | — | — | 274 | 321 | 312 | 197 | — | — | — | — |
| Stanford Coronary Risk Intervention Program (SCRIP) | — | — | — | 578 | 577 | 822 | 899 | 1,102 | 1,405 | 1,485 | 1,410 |
| Potassium and Sodium to Control Blood Pressure | — | — | — | 326 | 428 | 399 | 445 | 294 | — | — | — |
| Platelet Inhibitor Drug Trial in Coronary Angioplasty | — | — | — | 240 | 295 | 283 | 316 | 281 | — | — | — |
| Continuation of Trial of Antihypertensive Intervention Management (COTAIM) | — | — | — | — | 1,236 | 2,041 | 2,192 | 1,353 | 2,208 | 1,914 | 1,780 |
| Randomized Trial of Diets in Obese Hypertensives | — | — | — | — | 294 | 477 | 444 | 223 | 290 | — | — |
| Polyunsaturates and KCl to Control Mild Hypertension | — | — | — | — | 140 | 140 | — | 275 | — | 266 | 272 |
| Boston Area Anticoagulation Trial for Atrial Fibrillation | — | — | — | — | — | 260 | 291 | 329 | 522 | 495 | 479 |
| Comparison of Electrophysiologic to ECG Monitoring | — | — | — | — | — | 1,123 | 1,371 | 1,795 | — | 959 | 794 |
| Prevention of Coronary Aneurysm in Kawasaki Syndrome | — | — | — | — | — | 685 | 738 | 492 | 1,654 | 822 | — |
| Sodium-Potassium Blood Pressure Trial in Children | — | — | — | — | — | 589 | 453 | 461 | 586 | 563 | 206 |

## NHLBI Investigator-Initiated Clinical Trials: Fiscal Years 1980-1990 (continued)

Research Grants (Dollars in Thousands)

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Heart and Vascular Diseases (continued) | | | | | | | | | | | |
| Treatment of Mild Hypertension Study (TOMHS) | — | — | — | — | — | 1,639 | 2,661 | 2,770 | 2,499 | — | 1,931 |
| Optimal Exercise Regimens for Persons at Increased Risk | — | — | — | — | — | — | 587 | 649 | 528 | 520 | — |
| Immunosuppressive Therapy for Biopsy-Proven Myocarditis | — | — | — | — | — | — | 1,660 | 1,718 | — | 1,591 | — |
| Diuretics, Hypertension and Arrhythmias Clinical Trial | — | — | — | — | — | — | 385 | 438 | 341 | 41 | 127 |
| Recurrent Carotid Stenosis | — | — | — | — | — | — | 147 | 172 | 182 | 186 | 120 |
| Training Level vs. Cardiac Adaptations in Coronary Disease | — | — | — | — | — | — | — | 289 | 413 | 395 | 339 |
| Controlled Trial to Reverse Coronary Atherosclerosis | — | — | — | — | — | — | — | 441 | 387 | 438 | 459 |
| Randomized Amiodarone Therapy for Ventricular Fibrillation | — | — | — | — | — | — | — | 625 | 601 | 627 | 664 |
| Emory Angioplasty Surgery Trial (EAST) | — | — | — | — | — | — | — | 942 | 1,553 | 1,430 | 1,877 |
| Trial of Lovastatin and Aspirin in Atherosclerosis | — | — | — | — | — | — | — | — | 1,164 | 1,170 | 843 |
| Myocardial Infarction Triage and Intervention Project (MITI) | — | — | — | — | — | — | — | — | 730 | 643 | 624 |
| Infant Heart Surgery: Central Nervous System Sequelae of Circulatory Arrest | — | — | — | — | — | — | — | — | — | 588 | 623 |
| Lifestyle Heart Trial | — | — | — | — | — | — | — | — | — | 515 | 530 |
| Thrombolysis in Myocardial Ischemia (TIMI) | — | — | — | — | — | — | — | — | — | 4,029 | 1,957 |
| Prevention of Early Readmission in Elderly Congestive Heart Failure Patients | — | — | — | — | — | — | — | — | — | — | 90 |
| Subtotal, Heart and Vascular Diseases | 8,438 | 10,506 | 12,107 | 11,662 | 13,691 | 17,235 | 19,862 | 21,234 | 19,659 | 22,347 | 17,672 |
| **Lung Diseases** | | | | | | | | | | | |
| Human Surfactant Treatment of Respiratory Distress Syndrome | — | — | — | — | — | — | 229 | 234 | 242 | 270 | — |
| Trial of Inspiratory Muscle Rest and Exercise in Chronic Obstructive Lung Disease | — | — | — | — | — | — | 533 | 377 | 159 | 34 | — |
| Extracorporeal Carbon Dioxide Removal for Adult Respiratory Distress Syndrome | — | — | — | — | — | — | — | 435 | 359 | 237 | — |
| Emphysema: Physiologic Effects of Nutritional Support | — | — | — | — | — | — | — | — | — | — | 215 |
| Cardiopulmonary Effects of Ibuprofen in Human Sepsis | — | — | — | — | — | — | — | — | — | — | 799 |
| Subtotal, Lung Diseases | — | — | — | — | — | — | 762 | 1,046 | 760 | 541 | 1,014 |
| **Blood Diseases and Resources** | | | | | | | | | | | |
| Transfusion-Transmitted Cytomegalovirus Prevention | — | — | — | 232 | 242 | 243 | — | — | — | — | — |
| Erythropoietin for Anemia Due to Zidovudine in Human Immunodeficiency Virus Infection | — | — | — | — | — | — | — | — | 240 | 251 | 229 |
| Chelation Therapy of Iron Overload with Pyridoxal Isonicotinoyl Hydrazone (PIH) | — | — | — | — | — | — | — | — | — | 202 | 203 |
| Subtotal, Blood Diseases and Resources | — | — | — | 232 | 242 | 243 | — | — | 240 | 453 | 432 |
| **Total, NHLBI** | **$8,438** | **$10,506** | **$12,107** | **$11,894** | **$13,933** | **$17,478** | **$20,624** | **$22,280** | **$20,659** | **$23,341** | **$19,118** |

## NHLBI Investigator-Initiated Clinical Trials, Fiscal Year 1990: Summary by Program

| | Total Obligations Prior to FY 1990 | Total FY 1990 Obligations | Total Obligations To Date |
|---|---|---|---|
| **Heart and Vascular Diseases** | | | |
| Program on Surgical Control of Hyperlipidemias (POSCH) | $ 46,971,137 | $ 1,901,630 | $ 48,872,767 |
| Physicians' Health Study | 4,559,886 | 645,104 | 5,204,990 |
| Stanford Coronary Risk Intervention Program (SCRIP) | 6,868,663 | 1,410,021 | 8,278,684 |
| Continuation of Trial of Antihypertensive Intervention Management (COTAIM) | 10,944,325 | 1,780,224 | 12,724,549 |
| Polyunsaturates and KCl to Control Mild Hypertension | 820,556 | 271,777 | 1,092,333 |
| Boston Area Anticoagulation Trial for Atrial Fibrillation | 1,896,888 | 479,374 | 2,376,262 |
| Comparison of Electrophysiologic to ECG Monitoring | 5,248,756 | 793,981 | 6,042,737 |
| Sodium-Potassium Blood Pressure Trial in Children | 2,652,054 | 206,148 | 2,858,252 |
| Treatment of Mild Hypertension Study (TOMHS) | 9,568,525 | 1,931,000 | 11,499,525 |
| Diuretics, Hypertension and Arrhythmias Clinical Trial | 1,204,687 | 126,975 | 1,331,662 |
| Recurrent Carotid Stenosis | 687,286 | 119,721 | 807,007 |
| Training Level vs. Cardiac Adaptations in Coronary Disease | 1,096,335 | 338,675 | 1,435,010 |
| Controlled Trial to Reverse Coronary Atherosclerosis | 1,265,712 | 458,768 | 1,724,480 |
| Randomized Amiodarone Therapy for Ventricular Fibrillation | 1,852,669 | 664,361 | 2,517,030 |
| Emory Angioplasty Surgery Trial (EAST) | 3,925,463 | 1,877,259 | 5,802,722 |
| Trial of Lovastatin and Aspirin in Atherosclerosis | 2,334,129 | 842,645 | 3,176,774 |
| Myocardial Infarction Triage and Intervention Project (MITI) | 1,372,962 | 623,880 | 1,996,842 |
| Infant Heart Surgery: Central Nervous System Sequelae of Circulatory Arrest | 587,741 | 623,401 | 1,211,142 |
| Lifestyle Heart Trial | 514,996 | 530,104 | 1,045,100 |
| Thrombolysis in Myocardial Ischemia (TIMI) | 4,029,361 | 1,957,462 | 5,986,823 |
| Prevention of Early Readmission in Elderly Congestive Heart Failure Patients | 0 | 89,914 | 89,914 |
| Subtotal, Heart and Vascular Diseases | 108,402,131 | 17,672,474 | 126,074,605 |
| **Lung Diseases** | | | |
| Emphysema: Physiologic Effects of Nutritional Support | 0 | 214,857 | 214,857 |
| Cardiopulmonary Effects of Ibuprofen in Human Sepsis | 0 | 798,613 | 798,613 |
| Subtotal, Lung Diseases | 0 | 1,013,470 | 1,013,470 |
| **Blood Diseases and Resources** | | | |
| Erythropoietin for Anemia Due to Zidovudine in Human Immunodeficiency Virus Infection | 491,294 | 229,290 | 720,584 |
| Chelation Therapy of Iron Overload With Pyridoxal Isonicotinoyl Hydrazone (PIH) | 202,220 | 203,085 | 405,305 |
| Subtotal, Blood Diseases and Resources | 693,514 | 432,375 | 1,125,889 |
| **Total, NHLBI** | **$109,095,645** | **$19,118,319** | **$128,213,964** |

## Institute-Initiated Clinical Trials, Fiscal Years 1980-1990

**Contracts (Dollars in Thousands)**

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| Heart and Vascular Diseases | | | | | | | | | | | |
| Aspirin Myocardial Infarction Study | $ 372 | $ — | $ — | $ — | $— | $— | $— | $ — | $— | $— | $— |
| Beta-Blocker Heart Attack Trial | 3,847 | 3,887 | 241 | 153 | — | — | — | — | — | — | — |
| Coronary Artery Surgery Study | 4,444 | 2,401 | 2,111 | 795 | 2,925 | — | — | — | — | — | — |
| Hypertension Detection and Follow-up Program | 3,431 | 1,284 | 2,277 | 1,141 | 8 | — | — | — | — | — | — |
| Lipid Research Clinics* | 15,493 | 16,248 | 10,558 | 17,348 | 1,702 | 7,078 | 3,535 | — | 2,205 | 1,117 | 485 |
| Multicenter Investigation of Limitation of Infarct Size | 2,685 | 3,490 | 3,134 | 2,566 | 241 | 497 | — | — | — | — | — |
| Multiple Risk Factor Intervention Trial | 9,402 | 10,989 | 2,897 | 1,400 | — | — | — | — | — | — | — |
| Cardiac Arrhythmia Pilot Study | — | — | 347 | 2,062 | 2,914 | 1,833 | 693 | — | — | — | — |
| Thrombolysis in Myocardial Infarction | — | — | — | 803 | 4,208 | 4,113 | 6,579 | 7,399 | 7,986 | — | — |
| Systolic Hypertension in the Elderly Program | — | — | — | — | 844 | 3,865 | 4,137 | 4,228 | 2,447 | 3,820 | 2,887 |
| Studies of Left Ventricular Dysfunction | — | — | — | — | — | 1,996 | 7,025 | 3,619 | 6,200 | 6,634 | 4,855 |
| Cardiac Arrhythmia Suppression Trial | — | — | — | — | — | — | 1,564 | 5,857 | 8,125 | 8,968 | 9,988 |
| Multiple Risk Factor Intervention Trial Extension | — | — | — | — | — | — | 600 | 900 | — | — | — |
| Post Coronary Artery Bypass Graft Study | — | — | — | — | — | — | — | 400 | 4,040 | 4,050 | 2,832 |
| Effects of Digitalis in Patients With Congestive Heart Failure | — | — | | — | — | — | — | — | — | — | 604 |
| Subtotal, Heart and Vascular Diseases | 39,674 | 38,299 | 21,565 | 26,268 | 12,842 | 19,382 | 24,133 | 22,403 | 31,003 | 24,589 | 21,651 |
| **Lung Diseases** | | | | | | | | | | | |
| Clinical Study of Intermittent Positive Pressure Breathing | 1,543 | 2,024 | 1,520 | 588 | 24 | — | — | — | — | — | — |
| Neonatal Respiratory Distress Syndrome | 746 | 454 | 563 | — | — | — | — | — | — | — | |
| Nocturnal Oxygen Therapy | 371 | — | — | 16 | — | — | — | — | — | — | — |
| Prospective Investigation of Pulmonary Embolism Diagnosis | — | — | — | 423 | 1,200 | 4,242 | 1,772 | — | — | — | — |
| High Frequency Intervention | — | — | — | — | 412 | 5,418 | 1,026 | 1,216 | 300 | — | — |
| Lung Health Study | — | — | — | — | 510 | 388 | 1,869 | 10,100 | 2,898 | 5,349 | 5,875 |
| Subtotal, Lung Diseases | 2,660 | 2,478 | 2,083 | 1,027 | 2,146 | 10,048 | 4,667 | 11,316 | 3,198 | 5,349 | 5,875 |
| **Blood Diseases and Resources** | | | | | | | | | | | |
| Clinical Course of Sickle Cell Disease† | 3,910 | 3,394 | 5,608 | 2,128 | 7,821 | 4,302 | — | 3,111 | 2,328 | 2,361 | 2,118 |
| Penicillin Prophylaxis in Sickle Cell Disease (PROPS II) | — | — | — | — | — | — | — | 397 | 860 | 686 | 860 |
| Subtotal, Blood Diseases and Resources | 3,910 | 3,394 | 5,608 | 2,128 | 7,821 | 4,302 | — | 3,508 | 3,188 | 3,047 | 2,978 |
| **Total, NHLBI, Contracts** | **$46,244** | **$44,171** | **$29,256** | **$29,423** | **$22,809** | **$33,732** | **$28,800** | **$37,227** | **$37,389** | **$32,985** | **$30,504** |

(continued)

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*Includes Coronary Primary Prevention Trial (CPPT) costs.

†Fiscal year 1986 funds were not required.

## Institute-Initiated Clinical Trials, Fiscal Years 1980-1990 (continued)

Cooperative Agreements (Dollars in Thousands)

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| **Heart and Vascular Diseases** | | | | | | | | | | | |
| Trials of Hypertension Prevention (TOHP) | $ — | $ — | $ — | $ — | $ — | $ — | $ 1,500 | $ 6,166 | $ 5,020 | $ 4,774 | $5,760 |
| Dietary Intervention Study in Children (DISC) | — | — | — | — | — | — | — | 1,169 | 2,051 | 3,023 | 4,616 |
| Bypass Angioplasty Revascularization Investigation (BARI) | — | — | — | — | — | — | — | 716 | 4,545 | 5,539 | 6,216 |
| Postmenopausal Estrogen/Progestin Interventions (PEPI) | — | — | — | — | — | — | — | 550 | 2,882 | 1,336 | 2,158 |
| Child and Adolescent Trial for Cardiovascular Health (CATCH) | — | — | — | — | — | — | — | 1,210 | 1,919 | 1,977 | 1,012 |
| Do Fish Oils Prevent Restenosis Post Coronary Angioplasty? | — | — | — | — | — | — | — | — | — | 1,069 | 1,352 |
| HMG-CoA Reductase Inhibitors | — | — | — | — | — | — | — | — | — | — | 150 |
| Subtotal, Heart and Vascular Diseases | — | — | — | — | — | — | 1,500 | 9,811 | 16,417 | 17,718 | 21,264 |
| **Blood Diseases and Resources** | | | | | | | | | | | |
| Hydroxyurea in Patients With Sickle Cell Anemia | — | — | — | — | — | — | — | 441 | 479 | 509 | 44 |
| Transfusion Trial for Prevention of Platelet Alloimmunization | — | — | — | — | — | — | — | — | — | 747 | 2,034 |
| Subtotal, Blood Diseases and Resources | — | — | — | — | — | — | — | 441 | 479 | 1,256 | 2,078 |
| **Total, NHLBI, Cooperative Agreements** | **—** | **—** | **—** | **—** | **—** | **—** | **$1,500** | **$ 10,252** | **$16,896** | **$18,974** | **$23,342** |
| **Total, NHLBI-Initiated Clinical Trials** | **$46,244** | **$44,171** | **$29,256** | **$29,423** | **$22,809** | **$33,732** | **$30,300** | **$47,479** | **$54,285** | **$51,959** | **$53,847** |

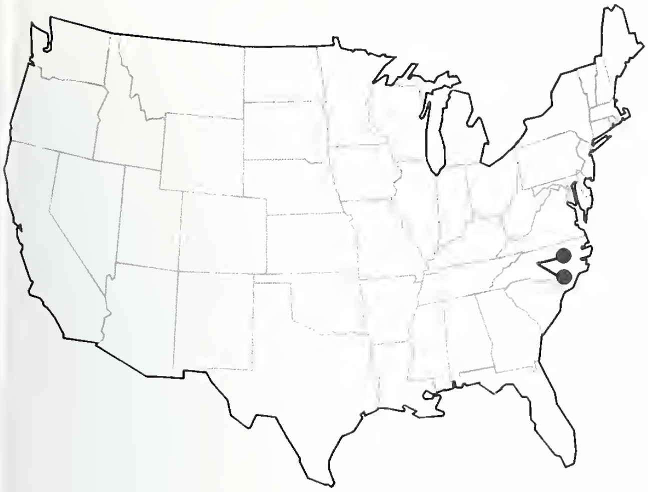
## Institute-Initiated Clinical Trials, Fiscal Year 1990: Summary by Program

| | Contracts | | |
|---|---|---|---|
| | **Total Obligations Prior to FY 1990*** | **Total FY 1990 Obligations** | **Total Obligations To Date** |
| **Heart and Vascular Diseases** | | | |
| Lipid Research Clinics† | $185,937,260 | $484,568 | $186,421,828 |
| Systolic Hypertension in the Elderly Program | 19,341,125 | 2,887,096 | 22,228,221 |
| Studies of Left Ventricular Dysfunction | 25,473,319 | 4,854,904 | 30,328,223 |
| Cardiac Arrhythmia Suppression Trial | 24,515,027 | 9,987,810 | 34,502,837 |
| Post Coronary Artery Bypass Graft Study | 8,490,311 | 2,832,000 | 11,322,311 |
| Effects of Digitalis in Patients With Congestive Heart Failure | 0 | 604,000 | 604,000 |
| Subtotal, Heart and Vascular Diseases | 263,757,042 | 21,650,378 | 285,407,420 |
| **Lung Diseases** | | | |
| Lung Health Study | 21,113,038 | 5,875,169 | 26,988,207 |
| Subtotal, Lung Diseases | 21,113,038 | 5,875,169 | 26,988,207 |
| **Blood Diseases and Resources** | | | |
| Clinical Course of Sickle Cell Disease | 40,981,858 | 2,118,353 | 43,100,211 |
| Penicillin Prophylaxis in Sickle Cell Disease (PROPS II) | 1,942,939 | 859,914 | 2,802,853 |
| Subtotal, Blood Diseases and Resources | 42,924,797 | 2,978,267 | 45,903,064 |
| **Total, NHLBI, Contracts** | **$327,794,877** | **$30,503,814** | **$358,298,691** |

| | Cooperative Agreements | | |
|---|---|---|---|
| | **Total Obligations Prior to FY 1990** | **Total FY 1990 Obligations** | **Total Obligations To Date** |
| **Heart and Vascular Diseases Program** | | | |
| Trials of Hypertension Prevention (TOHP) | $17,459,302 | $5,760,146 | $23,219,448 |
| Dietary Intervention Study in Children (DISC) | 6,243,381 | 4,615,670 | 10,859,051 |
| Bypass Angioplasty Revascularization Investigation (BARI) | 10,800,766 | 6,215,746 | 17,016,512 |
| Postmenopausal Estrogen/Progestin Interventions (PEPI) | 4,773,187 | 2,158,000 | 6,931,187 |
| Child and Adolescent Trial of Cardiovascular Health (CATCH) | 5,106,317 | 1,012,375 | 6,118,692 |
| Do Fish Oils Prevent Restenosis Post Coronary Angioplasty? | 1,068,878 | 1,352,108 | 2,420,986 |
| HMG-CoA Reductase Inhibitors | 0 | 150,000 | 150,000 |
| Subtotal, Heart and Vascular Diseases | 45,451,831 | 21,264,045 | 66,715,876 |
| **Blood Diseases and Resources Program** | | | |
| Hydroxyurea in Patients With Sickle Cell Anemia | 1,428,368 | 44,192 | 1,472,560 |
| Transfusion Trial for Prevention of Platelet Alloimmunization | 746,654 | 2,034,478 | 2,781,132 |
| Subtotal, Blood Diseases and Resources | 2,175,022 | 2,078,670 | 4,253,692 |
| **Total, NHLBI, Cooperative Agreements** | **47,626,853** | **23,342,715** | **70,969,568** |
| **Total, NHLBI-Initiated Clinical Trials** | **$375,421,730** | **$53,846,529** | **$429,268,259** |

*Includes fiscal year 1976 Transition Quarter.

†Includes Coronary Primary Prevention Trial (CPPT) costs.



## Lipid Research Clinics (LRC): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1971

In these clinics, a climate is created for better diagnosis, management, and further research studies in hyperlipoproteinemia. Studies include the prevalence of abnormalities, their causes and treatment, and the effect of this treatment on premature atherosclerosis. In the Coronary Primary Prevention Trial (CPPT), the largest component of the LRC, researchers test the hypothesis that long-term reduction of serum cholesterol in men with elevated cholesterol will lead to a reduction in coronary heart disease.

### Obligations

Funding History:
Fiscal Year 1990—$484,568
(CPPT*—$0)
Fiscal Years 1971-1989—$185,937,260
(CPPT*—$142,250,000)
Total Funding to Date—$186,421,828
(CPPT—$142,250,000)

### Current Active Organizations and Contract Numbers

| | |
|---|---|
| 1. University of North Carolina, Chapel Hill, North Carolina | —HV-0-8112 |
| 2. Registry and Coordinating Center: University of North Carolina, Chapel Hill, North Carolina | —HV-1-2243 |

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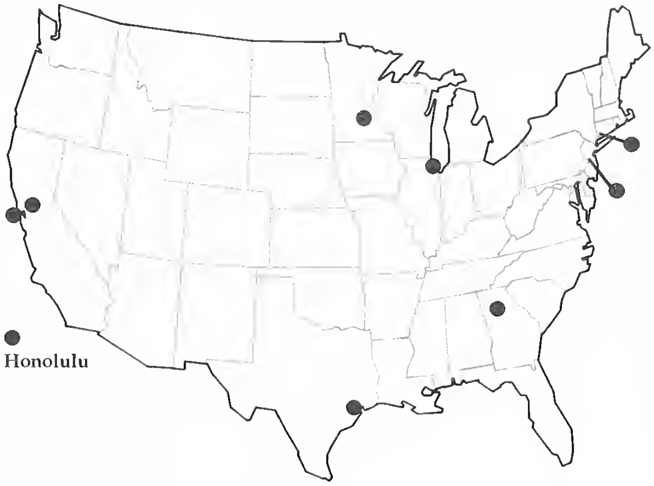
*Includes CPPT costs.



## Systolic Hypertension in the Elderly Program (SHEP): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1984

This trial assesses whether long-term administration of antihypertensive therapy to elderly subjects with isolated systolic hypertension reduces the combined incidence of fatal and nonfatal stroke.

### Obligations

Funding History:*
Fiscal Year 1990—$2,887,096
Fiscal Years 1984-1989—$19,341,125
Total Funding to Date—$22,228,221

### Current Active Organizations and Contract Numbers

| | |
|---|---|
| 1. Coordinating Center: Texas Health Science Center, Houston, Texas | —HC-4-8052 |
| 2. University of California, Davis, California | —HC-4-8054 |
| 3. Emory University, Atlanta, Georgia | —HC-4-8056 |
| 4. Medical Research Institute of San Francisco, San Francisco, California | —HC-4-8060 |
| 5. University of Minnesota, Minneapolis, Minnesota | —HC-4-8062 |
| 6. Northwestern University, Evanston, Illinois | —HC-4-8063 |
| 7. Pacific Health Research Institute, Honolulu, Hawaii | —HC-4-8064 |
| 8. University of New Jersey, Piscataway, New Jersey | —HC-4-8066 |
| 9. Yale University, New Haven, Connecticut | —HC-4-8069 |

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*Joint funding by NHLBI and NIA. Amounts shown are NHLBI funds only.

## Studies of Left Ventricular Dysfunction (SOLVD): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1985

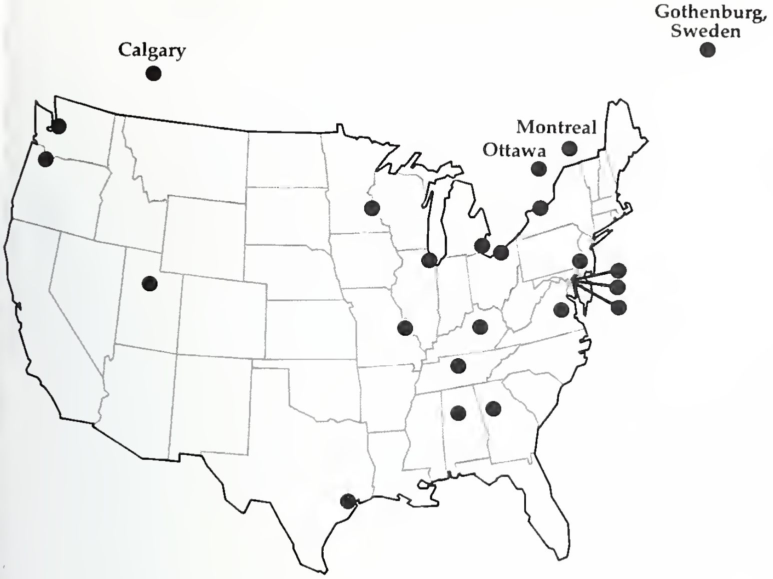
This study will determine if several drug treatments of left ventricular dysfunction (LVD) due to ischemic or hypertensive heart disease will lead to reduced mortality and morbidity in symptomatic and asymptomatic patients.

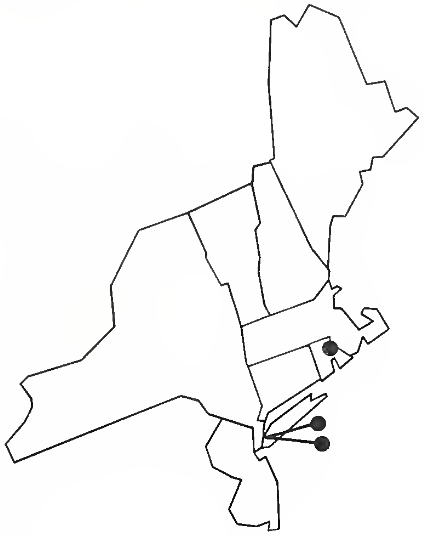
### Obligations

Funding History:
Fiscal Year 1990—$4,854,904
Fiscal Years 1985-1989—$25,473,319
Total Funding to Date—$30,328,223

### Current Active Organizations and Contract Numbers

| | |
|---|---|
| 1. University of North Carolina, Chapel Hill, North Carolina | —HC-5-5000 |
| 2. Albert Einstein College of Medicine, Bronx, New York | —HC-5-5002 |
| 3. Baylor College of Medicine, Houston, Texas | —HC-5-5004 |
| 4. Dalhousie University, Halifax, Nova Scotia, Canada | —HC-5-5005 |
| 5. Hahnemann University, Philadelphia, Pennsylvania | —HC-5-5006 |
| 6. University of Illinois, Chicago, Illinois | —HC-5-5007 |
| 7. Michigan State University, East Lansing, Michigan | —HC-5-5008 |
| 8. University of Minnesota, Minneapolis, Minnesota | —HC-5-5009 |
| 9. New England Medical Center Hospitals, Inc., Boston, Massachusetts | —HC-5-5010 |
| 10. Oregon Health Sciences University, Portland, Oregon | —HC-5-5011 |
| 11. New York State University Research Foundation, Albany, New York | —HC-5-5012 |
| 12. Rhode Island Hospital, Providence, Rhode Island | —HC-5-5013 |
| 13. University of Rochester, Rochester, New York | —HC-5-5014 |
| 14. Catholic University of Louvain, Louvain, Belgium | —HC-6-5030 |
| 15. University of Florida, Gainesville, Florida | —HC-6-5031 |
| 16. University of New Jersey, Piscataway, New Jersey | —HC-6-5032 |
| 17. University of Michigan, Ann Arbor, Michigan | —HC-6-5033 |
| 18. Montreal Heart Institute, Montreal, Quebec, Canada | —HC-6-5034 |
| 19. New York Medical College, Valhalla, New York | —HC-6-5035 |
| 20. Overlook Hospital, Summit, New Jersey | —HC-6-5036 |
| 21. Vanderbilt University School of Medicine, Nashville, Tennessee | —HC-6-5037 |
| 22. University of Washington, Seattle, Washington | —HC-6-5038 |





## Cardiac Arrhythmia Suppression Trial (CAST): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1986

The objective of the CAST is to test whether suppression of asymptomatic ventricular arrhythmias in postmyocardial infarction patients results in a reduction in death due to arrhythmia. To this end, about 2,000 patients will be randomly assigned to active medication (moricizine) or placebo and followed for an average of 3 ½ years.

### Obligations

Funding History:
Fiscal Year 1990—$9,987,810
Fiscal Years 1986-1989—$24,515,027
Total Funding to Date—$34,502,837

### Current Active Organizations and Contract Numbers

| | | |
|---|---|---|
| 1. | University of Washington, Seattle, Washington | —HC-6-5042 |
| 2. | Baylor College of Medicine, Houston, Texas | —HC-6-5043 |
| 3. | University of Alabama, Birmingham, Alabama | —HC-6-5044 |
| 4. | University of Calgary, Calgary, Alberta, Canada | —HC-6-5046 |
| 5. | Case Western Reserve University, Cleveland, Ohio | —HC-6-5047 |
| 6. | Columbia University, New York, New York | —HC-6-5048 |
| 7. | Emory University, Atlanta, Georgia | —HC-6-5049 |
| 8. | University of Gothenburg, Gothenburg, Sweden | —HC-6-5050 |
| 9. | Hahnemann University, Philadelphia, Pennsylvania | —HC-6-5051 |
| 10. | Henry Ford Hospital, Detroit, Michigan | —HC-6-5052 |
| 11. | University of Maryland, Baltimore, Maryland | —HC-6-5053 |
| 12. | Medical College of Virginia, Richmond, Virginia | —HC-6-5055 |
| 13. | University of Minnesota, Minneapolis, Minnesota | —HC-6-5056 |
| 14. | Montreal Heart Institute, Montreal, Quebec, Canada | —HC-6-5057 |
| 15. | Oregon Health Sciences University, Portland, Oregon | —HC-6-5058 |
| 16. | Ottawa Heart Institute, Ottawa, Ontario, Canada | —HC-6-5059 |
| 17. | Rhode Island Hospital, Providence, Rhode Island | —HC-6-5060 |
| 18. | University of Rochester, Rochester, New York | —HC-6-5061 |
| 19. | Rush-Presbyterian-St. Luke's Medical Center, Chicago, Illinois | —HC-6-5062 |
| 20. | Salt Lake Clinic Research Foundation, Salt Lake City, Utah | —HC-6-5063 |
| 21. | St. Louis University Medical Center, St. Louis, Missouri | —HC-6-5064 |
| 22. | Vanderbilt University, Nashville, Tennessee | —HC-6-5065 |
| 23. | Medlantic Research Foundation of Washington Healthcare Corp., Washington, D.C. | —HC-6-5066 |
| 24. | New York University State Research Foundation, Brooklyn, New York | —HC-6-5067 |
| 25. | The George Washington University, Washington, D.C. | —HC-6-5068 |
| 26. | University of Kentucky Research Foundation, Lexington, Kentucky | —HC-6-5069 |

## Trials of Hypertension Prevention (TOHP): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1986

This trial is testing the feasibility and efficacy of nutritional interventions in the primary prevention of hypertension in men and women at increased risk of developing hypertension.

### Obligations

Funding History:
Fiscal Year 1990—$5,760,146
Fiscal Years 1986-1989—$17,459,302
Total Funding to Date—$23,219,448

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | University of Tennessee Health Science Center, Memphis, Tennessee | —HL37849 |
| 2. | Brigham and Women's Hospital, Boston, Massachusetts | —HL37852 |
| 3. | University of Pittsburgh, Pittsburgh, Pennsylvania | —HL37853 |
| 4. | University of Mississippi Medical Center, Jackson, Mississippi | —HL37854 |
| 5. | University of Medicine and Dentistry of New Jersey, Newark, New Jersey | —HL37884 |
| 6. | Kaiser Foundation Research Institute, Portland, Oregon | —HL37899 |
| 7. | University of California, Davis, Davis, California | —HL37904 |
| 8. | St. Louis University, St. Louis, Missouri | —HL37906 |
| 9. | University of Alabama, Birmingham, Alabama | —HL37907 |
| 10. | The Johns Hopkins University, Baltimore, Maryland | —HL37924 |

## Post Coronary Artery Bypass Graft Study: Heart and Vascular Diseases Program, Initiated in Fiscal Year 1987

This trial will evaluate whether lowering cholesterol by drug therapy or by the use of an antithrombotic agent (warfarin) will prevent the progression of late graft atherosclerosis. Additionally, a biobehavioral component will explore factors predicting adjustment to CABG surgery.

### Obligations

Funding History:
Fiscal Year 1990—$2,832,000
Fiscal Year 1987-1989—$8,490,311
Total Funding to Date—$11,322,311

### Current Active Organizations and Contract Numbers

| | | |
|---|---|---|
| 1. | Baylor College of Medicine, Houston, Texas | —HC-7-5071 |
| 2. | Cedars-Sinai Medical Center, Los Angeles, California | —HC-7-5072 |
| 3. | Cleveland Clinic Foundation, Cleveland, Ohio | —HC-7-5073 |
| 4. | University of Minnesota and the Minnesota Heart Institute, Minneapolis, Minnesota | —HC-7-5074 |
| 5. | Montreal Heart Institute, Montreal, Quebec, Canada | —HC-7-5075 |
| 6. | Coordinating Center: Maryland Medical Research Institute, Inc., Baltimore, Maryland | —HC-7-5076 |

## Dietary Intervention Study in Children (DISC): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1987

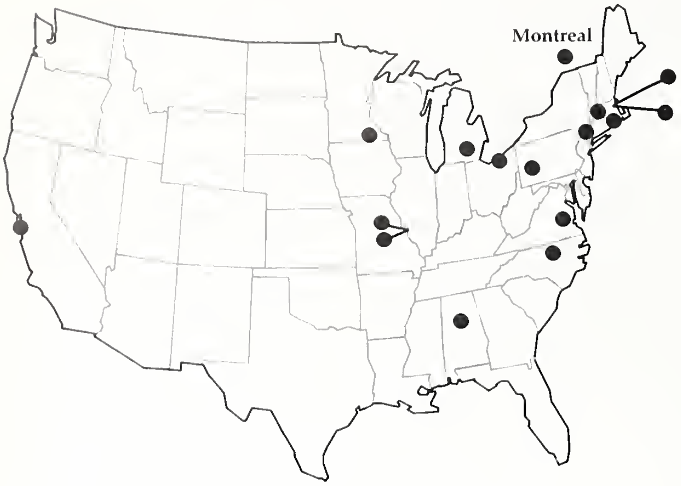
The objective of the DISC trial is to assess the feasibility, acceptability, efficacy, and safety of dietary intervention in children and adolescents with elevated low-density lipoprotein cholesterol levels.

### Obligations

Funding History:
Fiscal Year 1990—$4,615,670
Fiscal Years 1987-1989—$6,243,381
Total Funding to Date—$10,859,051

### Current Active Organizations and Grant Numbers

| | Organization | Grant Number |
|---|---|---|
| 1. | Northwestern University, Chicago, Illinois | —HL37947 |
| 2. | Maryland Medical Research Institute, Baltimore, Maryland | —HL37948 |
| 3. | Kaiser Foundation Research Institute, Portland, Oregon | —HL37954 |
| 4. | University of Iowa, Iowa City, Iowa | —HL37962 |
| 5. | University of Medicine and Dentistry of New Jersey, Newark, New Jersey | —HL37966 |
| 6. | The Johns Hopkins University, Baltimore, Maryland | —HL37975 |
| 7. | Children's Hospital, New Orleans, Louisiana | —HL38110 |



## Bypass Angioplasty Revascularization Investigation (BARI): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1987

This trial will assess the relative efficacy of percutaneous transluminal coronary angioplasty and coronary artery bypass graft surgery in patients who require revascularization and have coronary anatomy suitable for either procedure.

### Obligations

Funding History:
Fiscal Year 1990—$6,215,746
Fiscal Years 1987-1989—$10,800,766
Total Funding to Date—$17,016,512

### Current Active Organizations and Grant Numbers

Clinical Units

| | | |
|---|---|---|
| 1. | Mayo Foundation,<br>Rochester, Minnesota | —HL38493 |
| 2. | St. Louis University,<br>St. Louis, Missouri | —HL38504 |
| 3. | Montreal Heart Institute,<br>Montreal, Canada | —HL38509 |
| 4. | University of Alabama,<br>Birmingham, Alabama | —HL38512 |
| 5. | Beth Israel Hospital,<br>Boston, Massachusetts | —HL38514 |
| 6. | Virginia Commonwealth University,<br>Richmond, Virginia | —HL38515 |
| 7. | Duke University,<br>Durham, North Carolina | —HL38516 |
| 8. | Cleveland Clinic Foundation,<br>Cleveland, Ohio | —HL38518 |
| 9. | New York Medical College,<br>Valhalla, New York | —HL38524 |
| 10. | University Hospital,<br>Boston, Massachusetts | —HL38525 |
| 11. | University of Michigan,<br>Ann Arbor, Michigan | —HL38529 |
| 12. | Rhode Island Hospital,<br>Providence, Rhode Island | —HL38532 |
| 13. | University of Massachusetts<br>Medical School,<br>Worcester, Massachusetts | —HL38556 |

Coordinating Center and Core Laboratories

| | | |
|---|---|---|
| 14. | University of Pittsburgh,<br>Pittsburgh, Pennsylvania | —HL38610 |
| 15. | Stanford University,<br>Stanford, California | —HL38642 |
| 16. | St. Louis University,<br>St. Louis, Missouri | —HL42145 |

## Postmenopausal Estrogen/Progestin Interventions (PEPI): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1987

The PEPI trial will assess the effects of various postmenopausal estrogen replacement therapies on selected cardiovascular risk factors and osteoporosis risk factors.

### Obligations

Funding History*:
Fiscal Year 1990—$2,158,000
Fiscal Years 1987-1989—$4,773,187
Total Funding to Date—$6,931,187

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | University of Texas Health Science Center, San Antonio, Texas | —HL40154 |
| 2. | George Washington University, Washington, D.C. | —HL40185 |
| 3. | University of Iowa, Iowa City, Iowa | —HL40195 |
| 4. | Stanford University, Stanford, California | —HL40205 |
| 5. | University of California, San Diego, La Jolla, California | —HL40207 |
| 6. | The Johns Hopkins University, Baltimore, Maryland | —HL40231 |
| 7. | Bowman Gray School of Medicine, Winston-Salem, North Carolina | —HL40232 |
| 8. | University of California, Los Angeles, California | —HL40273 |

*PEPI is cofunded by NHLBI, NICHD, NIAMS, NIDDK, and NIA. Figures here are NHLBI only.

## Child and Adolescent Trial for Cardiovascular Health (CATCH): Heart and Vascular Diseases Program, Initiated in Fiscal Year 1987

This trial will assess the effectiveness of school-based risk reduction interventions involving three components: cardiovascular curriculum; parent participation; and environmental changes in the school.

### Obligations

Funding History:
Fiscal Year 1990—$1,012,375
Fiscal Years 1987-1989—$5,106,317
Total Funding to Date—$6,118,692

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | University of Minnesota, Minneapolis, Minnesota | —HL39852 |
| 2. | University of California, San Diego, La Jolla, California | —HL39870 |
| 3. | Boston University, Boston, Massachusetts | —HL39880 |
| 4. | Louisiana State University Medical Center, New Orleans, Louisiana | —HL39906 |
| 5. | University of Texas Health Science Center, Houston, Texas | —HL39927 |

## Do Fish Oils Prevent Restenosis Post Coronary Angioplasty?: Heart and Vascular Diseases Program, Initiated in Fiscal Year 1989

This double-blind, randomized, placebo-controlled, prospective trial will evaluate whether a dietary supplement of n-3 polyunsaturated fatty acids decreases the rate of restenosis in patients undergoing percutaneous transluminal coronary angioplasty.

### Obligations

Funding History:
  Fiscal Year 1990—$1,352,108
  Fiscal Year 1989—$1,068,878
Total Funding to Date—$2,420,986

### Current Active Organization and Grant Number

| | |
|---|---|
| 1. Massachusetts General Hospital, Boston, Massachusetts | —HL40548 |

## HMG-CoA Reductase Inhibitors: Heart and Vascular Diseases Program, Initiated in Fiscal Year 1990

This trial will determine whether substantially lowering elevated serum cholesterol levels in men and women aged 65 and older, by use of an HMG-CoA reductase inhibitor, will reduce mortality and morbidity due to the sequelae of atherosclerotic coronary heart disease.

### Obligations

Funding History:
  Fiscal Year 1990—$150,000
Total Funding to Date—$150,000

### Current Active Organizations and Grant Numbers

| | |
|---|---|
| 1. University of Tennessee at Memphis, Memphis, Tennessee | —HL44298 |
| 2. University of Washington, Seattle, Washington | —HL44299 |
| 3. University of North Carolina, Chapel Hill, North Carolina | —HL44311 |
| 4. George Washington University, Washington, D.C. | —HL44315 |
| 5. Wake Forest University, Winston-Salem, North Carolina | —HL44319 |
| 6. University of Minnesota, Minneapolis, Minnesota | —HL44327 |

## A Randomized Trial To Study the Effects of Digitalis on Survival in Patients With Congestive Heart Failure: Heart and Vascular Diseases Program, Initiated in Fiscal Year 1990

This trial will assess whether digitalis has a beneficial, harmful, or no effect on mortality in patients with congestive heart failure and whether digitalis treatment prevents worsening of heart failure and the need for rehospitalization. The study is currently in the implementation phase and will eventually recruit 7,000 patients over 3 years and follow the patients for a minimum of 2 years.

### Obligations

Funding History:
Fiscal Year 1990—$604,000
Total Funding to Date—$604,000

### Current Active Organization and Agreement Number

| | |
|---|---|
| 1. V.A. Hospital, Perry Point, Maryland | —HC-0-0110 |

## Lung Health Study: Lung Diseases Program, Initiated in Fiscal Year 1984

The trial will determine the effects on rate of decline in pulmonary function of "special care," compared with referral to "usual care," in a population of smokers identified as having mild abnormalities in pulmonary function. Special care includes smoking cessation counseling, bronchodilator administration, and diligent follow-up. In usual care, the subject is referred to his usual source of medical care.

### Obligations

Funding History:
Fiscal Year 1990—$5,875,169
Fiscal Years 1984-1989—$21,113,038
Total Funding to Date—$26,988,207

### Current Active Organizations and Contract Numbers

| | |
|---|---|
| 1. Coordinating Center: University of Minnesota, Minneapolis, Minnesota | —HR-4-6002 |
| 2. University of Pittsburgh, Pittsburgh, Pennsylvania | —HR-4-6013 |
| 3. University of Utah, Salt Lake City, Utah | —HR-4-6014 |
| 4. Henry Ford Hospital, Detroit, Michigan | —HR-4-6015 |
| 5. Oregon Health Sciences University, Portland, Oregon | —HR-4-6016 |
| 6. University of Manitoba, Winnipeg, Manitoba, Canada | —HR-4-6017 |
| 7. Mayo Foundation, Rochester, Minnesota | —HR-4-6018 |
| 8. University of Alabama, Birmingham, Alabama | —HR-4-6019 |
| 9. Case Western Reserve University, Cleveland, Ohio | —HR-4-6020 |
| 10. The Johns Hopkins University, Baltimore, Maryland | —HR-4-6021 |
| 11. University of California, Los Angeles, California | —HR-4-6022 |

## Cooperative Study of the Clinical Course of Sickle Cell Disease: Blood Diseases and Resources Program, Initiated in Fiscal Year 1977

This collaborative study is designed to identify and evaluate the factors that determine the clinical course of, and the presence or absence of complications in, sickle cell disease.

### Obligations

Funding History:
Fiscal Year 1990—$2,118,353
Fiscal Years 1977-1989—$40,981,858
Total Funding to Date—$43,100,211

### Current Active Organizations and Contract Numbers

| | |
|---|---|
| 1. Alta Bates-Herrick Hospital, Berkeley, California | —HB-9-7051 |
| 2. University of Chicago, Chicago, Illinois | —HB-9-7053 |
| 3. Children's Hospital, Oakland, California | —HB-9-7054 |
| 4. Children's Hospital, Philadelphia, Pennsylvania | —HB-9-7056 |
| 5. Columbia University, New York, New York | —HB-9-7058 |
| 6. Medical College of Georgia, Augusta, Georgia | —HB-9-7060 |
| 7. Howard University, Washington, D.C. | —HB-9-7061 |
| 8. University of Illinois, Chicago, Illinois | —HB-9-7062 |
| 9. University of Miami, Coral Gables, Florida | —HB-9-7064 |
| 10. St. Jude's Children's Research Hospital, Memphis, Tennessee | —HB-9-7066 |
| 11. Research Foundation, State University of New York, Albany, New York | —HB-9-7068 |
| 12. Research Foundation, State University of New York, Albany, New York | —HB-9-7069 |
| 13. University of Tennessee, Memphis, Tennessee | —HB-9-7070 |
| 14. Washington University, St. Louis, Missouri | —HB-9-7071 |
| 15. Yale University, New Haven, Connecticut | —HB-9-7072 |
| 16. New England Research Institute, Watertown, Massachusetts | —HB-9-7073 |
| 17. Interfaith Medical Center, Brooklyn, New York | —HB-0-7085 |

## Penicillin Prophylaxis in Sickle Cell Disease (PROPS II): Blood Diseases and Resources Program, Initiated in Fiscal Year 1987

This study is designed to determine if oral prophylactic penicillin can be safely discontinued at 5 years of age in children with sickle cell anemia, without increasing risk of infection due to *Streptococcus pneumoniae*.

### Obligations

Funding History:
Fiscal Year 1990—$859,914
Fiscal Years 1987-1989—$1,942,939
Total Funding to Date—$2,802,853

### Current Active Organizations and Contract Numbers

| | | |
|---|---|---|
| 1. | Children's Hospital, Oakland, California | —HB-7-7030 |
| 2. | Washington University, St. Louis, Missouri | —HB-7-7031 |
| 3. | University of Texas, Dallas, Texas | —HB-7-7032 |
| 4. | East Carolina University, Greenville, North Carolina | —HB-7-7033 |
| 5. | University of Arkansas, Little Rock, Arkansas | —HB-7-7034 |
| 6. | State University of New York, Brooklyn, New York | —HB-7-7035 |
| 7. | Duke University, Durham, North Carolina | —HB-7-7036 |
| 8. | St. Jude's Children's Research Hospital, Memphis, Tennessee | —HB-7-7037 |
| 9. | Children's Hospital National Medical Center, Washington, D.C. | —HB-7-7038 |
| 10. | University of Miami, Coral Gables, Florida | —HB-7-7039 |
| 11. | Children's Hospital Research Foundation, Columbus, Ohio | —HB-7-7040 |
| 12. | St. Luke's Roosevelt Institute for Health Science, New York, New York | —HB-7-7042 |
| 13. | University of Mississippi, Jackson, Mississippi | —HB-7-7043 |
| 14. | Children's Mercy Hospital, Kansas City, Missouri | —HB-7-7044 |
| 15. | Children's Hospital, Cincinnati, Ohio | —HB-7-7045 |
| 16. | Technical Resources, Inc., Rockville, Maryland | —HB-8-7046 |
| 17. | University of Illinois, Chicago, Illinois | —HB-8-7049 |
| 18. | Gamble Institute of Medical Research, Cincinnati, Ohio | —HB-8-7050 |

## Hydroxyurea in Patients With Sickle Cell Anemia: Blood Diseases and Resources Program, Initiated in Fiscal Year 1987

This study will determine the optimum dose, schedule, and short-term toxic effects of hydroxyurea in severely affected adults with sickle cell disease.

### Obligations

Funding History:
  Fiscal Year 1990—$44,192
  Fiscal Years 1987-1989—$1,428,368
Total Funding to Date—$1,472,560

### Current Active Organizations and Grant Numbers

| | | |
|---|---|---|
| 1. | The Johns Hopkins University, Baltimore, Maryland | —HL40002 |
| 2. | Medical College of Georgia, Augusta, Georgia | —HL40055 |

## Transfusion Trial for Prevention of Platelet Alloimmunization: Blood Diseases and Resources Program, Initiated in Fiscal Year 1989

This multicenter, cooperative, randomized transfusion trial will develop and implement methods to prevent formation of antibodies to transfused platelets.

### Obligations

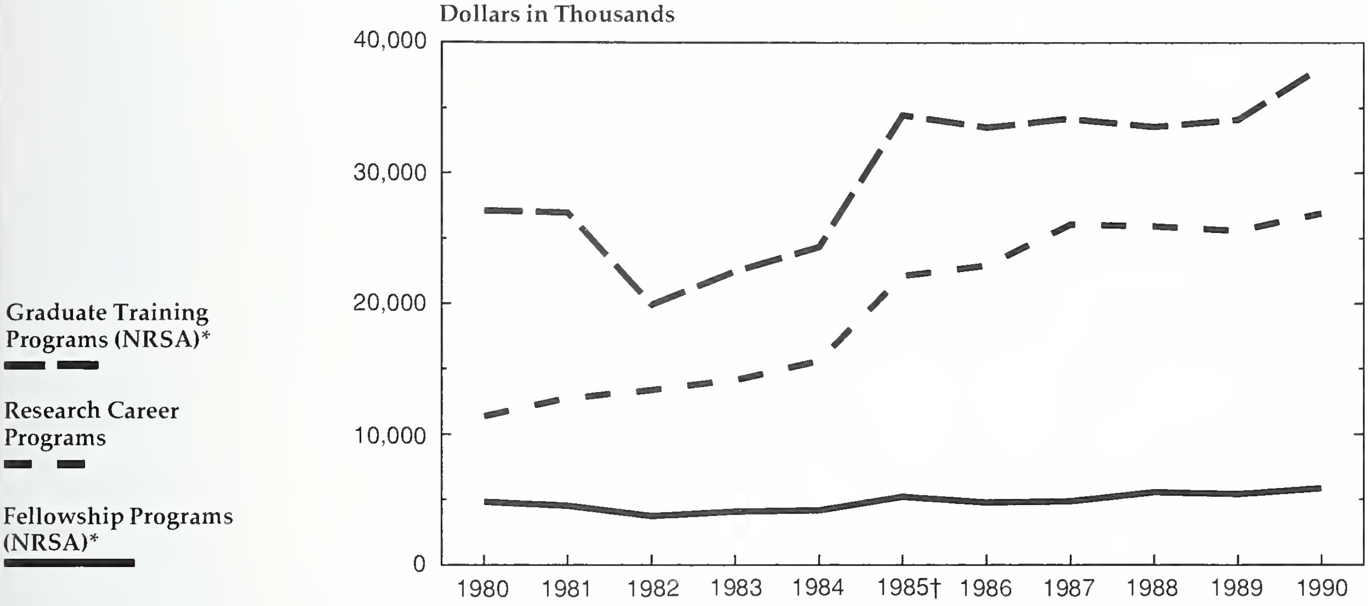
Funding History:
  Fiscal Year 1990—$2,034,478
  Fiscal Year 1989—$746,654
Total Funding to Date—$2,781,132

### Current Active Organizations and Grant Numbers

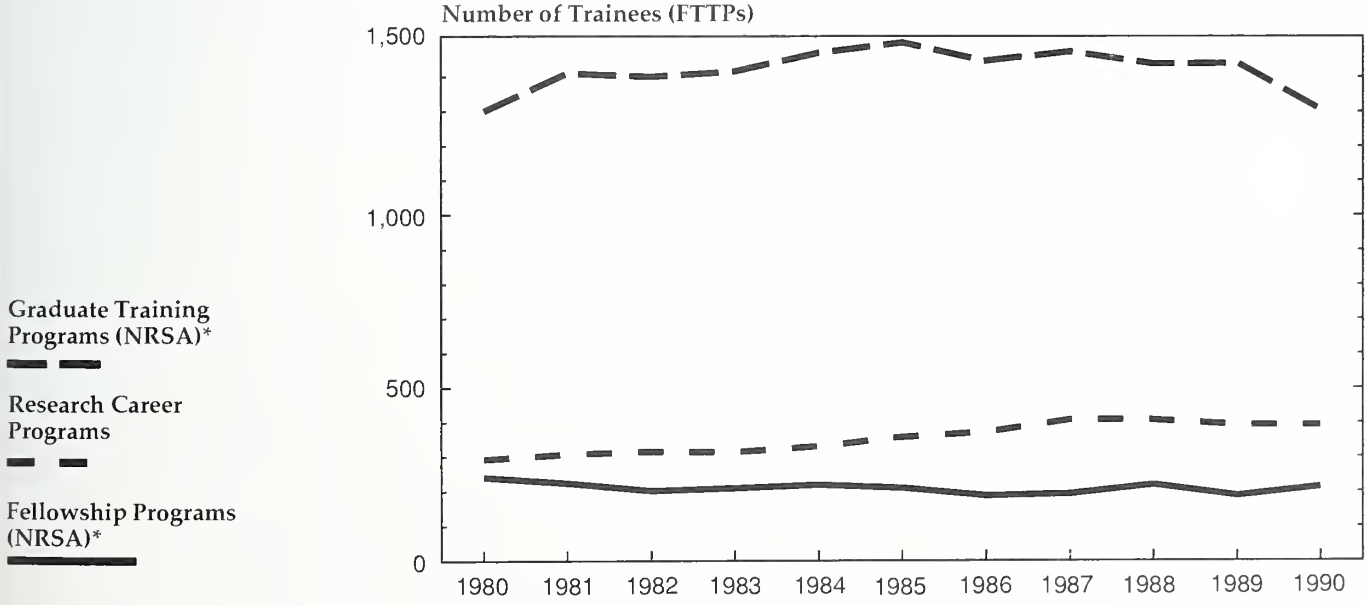
| | | |
|---|---|---|
| 1. | Puget Sound Blood Center, Seattle, Washington | —HL42799 |
| 2. | University of Minnesota, Minneapolis-St. Paul, Minnesota | —HL42802 |
| 3. | Duke University, Durham, North Carolina | —HL42805 |
| 4. | The Johns Hopkins University, Baltimore, Maryland | —HL42810 |
| 5. | University of Florida, Gainesville, Florida | —HL42811 |
| 6. | The Johns Hopkins University, Baltimore, Maryland | —HL42815 |
| 7. | University of Washington, Seattle, Washington | —HL42824 |
| 8. | Blood Center of Southeastern Wisconsin, Milwaukee, Wisconsin | —HL42832 |

# 13. Research Training and Career Development Programs

## Research Training and Career Development Obligations: Fiscal Years 1980-1990



## Number of Trainees (Full-Time Training Positions): Fiscal Years 1980-1990



*National Research Service Awards.

†In fiscal year 1985, the NIH increased the salary ceiling for research career awards from $30,000 to $40,000 and implemented a new stipend schedule for NRS Awards.

Note: Numbers of awards and trainees may not agree with other tables due to the method of counting supplements.

## Fiscal Year 1990 Training Awards, Full-Time Training Positions, and Obligations, by Activity*

| | Number of Awards Obligated | Trainees (Full-Time Training Positions) | Direct Cost | Indirect Cost | Total Cost | Percent of Total NHLBI Training Program Dollars |
|---|---|---|---|---|---|---|
| **Fellowship Programs** | | | | | | |
| Individual NRSA (F32) | 206 | 206 | $ 5,653,918 | $ 0 | $ 5,653,918 | 12.9 |
| Senior Fellowships NRSA (F33) | 5 | 5 | 129,423 | 0 | 129,423 | 0.3 |
| Minority Access to Research Career (MARC) Fellowships NRSA (F34) | 0 | 0 | 0 | 0 | 0 | 0 |
| Intramural NRSA (F35) | 3 | 3 | 91,000 | 0 | 91,000 | 0.2 |
| Subtotal, Fellowships | 214 | 214 | 5,874,341 | 0 | 5,874,341 | 13.4 |
| **Graduate Training Programs†** | | | | | | |
| Institutional NRSA (T32) | 166 | 1,205 | 34,327,424 | 2,423,982 | 36,751,406‡ | 83.5 |
| Minority Institutional NRSA (T32) | 4 | 21 | 374,572 | 23,863 | 398,435 | .9 |
| Minority Summer Hypertension NRSA (T35, T34) | 0 | 0 | 0 | 0 | 0 | 0 |
| Minority Summer Pulmonary NRSA (T35) | 0 | 0 | 0 | 0 | 0 | 0 |
| Off-Quarter Professional Student Training NRSA (T34, T35) | 14 | 79 | 886,207 | 70,587 | 956,794 | 2.2 |
| Minority Access to Research Career (MARC) Visiting Professors for Minority Institutions (T36) | (4) | (0) | 19,000 | (0) | 19,000 | 0.04 |
| Subtotal, Training Grants | 184 | 1,305 | 35,607,203 | 2,518,432 | 38,125,635‡ | 86.6 |
| **Total, Training Programs** | **398** | **1,519** | **$41,481,544** | **$2,518,432** | **$43,999,976** | **100.0** |

*Authorized.

†Estimate.

‡Excludes assessment of $444,740.

# History of Training Obligations by Activity for Fiscal Years 1980-1990

(Dollars in Thousands)

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1980* | 1981 | 1982 | 1983 | 1984 | 1985* | 1986 | 1987 | 1988 | 1989* | 1990 |
| **Fellowship Programs** | | | | | | | | | | | |
| Individual NRSA (F32) | 4,496 | 4,126 | 3,488 | 3,748 | 3,929 | 4,846 | 4,490 | 4,599 | 5,350 | 5,271 | 5,654 |
| Senior Fellowships NRSA (F33) | 228 | 298 | 107 | 202 | 156 | 230 | 77 | 121 | 6 | 95 | 129 |
| Minority Access to Research Career Fellowships NRSA (F34) | 90 | 72 | 110 | 133 | 90 | 21 | 35 | 26 | 53 | 13 | 0 |
| Intramural NRSA (F35) | — | — | — | — | — | 94 | 176 | 138 | 147 | 30 | 91 |
| Subtotal, Fellowships | 4,814 | 4,496 | 3,705 | 4,083 | 4,175 | 5,191 | 4,778 | 4,884 | 5,556 | 5,409 | 5,874 |
| **Graduate Training Programs** | | | | | | | | | | | |
| Institutional NRSA (T32) | 25,380 | 25,376 | 18,905 | 21,335 | 23,146 | 32,602 | 31,744 | 32,483 | 32,031 | 32,273 | 36,751 |
| Minority Institutional NRSA (T32) | — | — | — | — | — | — | 115 | 283 | 288 | 348 | 398 |
| Minority Summer Hypertension NRSA (T35, T34) | 583 | 591 | 355 | 382 | 443 | 706 | 599 | 320 | 126 | 80 | 0 |
| Minority Summer Pulmonary NRSA (T35) | — | — | — | — | — | — | 28 | 2 | 24 | 0 | 0 |
| Pulmonary Faculty Training NRSA (T17) | 193 | 464 | 89 | — | — | — | — | — | — | — | — |
| Off-Quarter Professional Student Training NRSA (T34, T35) | 647 | 908 | 666 | 770 | 758 | 1,111 | 1,020 | 1,069 | 1,068 | 1,386 | 957 |
| Minority Access to Research Career Visiting Professors for Minority Institutions (T36) | — | — | — | — | 5 | 13 | 7 | 7 | 14 | 10 | 19 |
| Subtotal, Training Grants | 27,074 | 26,964 | 19,926 | 22,487 | 24,352 | 34,432 | 33,513 | 34,164 | 33,551 | 34,097 | 38,125† |
| **Total, Training Programs** | **$31,888** | **$31,460** | **$23,631** | **$26,570** | **$28,527** | **$39,623** | **$38,291** | **$39,048** | **$39,107** | **$39,506** | **$43,999** |

*Stipend increase occurred in fiscal years 1980, 1985, and 1989.
†Excludes assessment of $444,740.

## Number of Trainees* by Activity (Full-Time Training Positions): Fiscal Years 1980-1990

| | Fiscal Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1980** | **1981** | **1982** | **1983** | **1984** | **1985** | **1986** | **1987** | **1988** | **1989** | **1990** |
| **Fellowship Programs** | | | | | | | | | | | |
| Individual NRSA (F32) | 230 | 212 | 193 | 197 | 210 | 196 | 177 | 182 | 210 | 184 | 206 |
| Senior Fellowships NRSA (F33) | 7 | 10 | 4 | 7 | 7 | 9 | 3 | 5 | 1 | 3 | 5 |
| Minority Access to Research Career Fellowships NRSA (F34) | 4 | 3 | 5 | 6 | 2 | 1 | 1 | 1 | 2 | 0 | 0 |
| Intramural NRSA (F35) | — | — | — | — | — | 4 | 7 | 5 | 5 | 1 | 3 |
| Subtotal, Fellowships | 241 | 225 | 202 | 210 | 219 | 210 | 188 | 193 | 218 | 188 | 214 |
| **Graduate Training Programs** | | | | | | | | | | | |
| Institutional NRSA (T32) | 1,168 | 1,241 | 1,260 | 1,266 | 1,317 | 1,313 | 1,270 | 1,304 | 1,278 | 1,257 | 1,205 |
| Minority Institutional NRSA (T32) | — | — | — | — | — | — | 4 | 16 | 18 | 30 | 21 |
| Minority Summer Hypertension NRSA (T35) | 29 | 36 | 25 | 28 | 37 | 42 | 33 | 23 | 6 | 5 | 0 |
| Minority Summer Pulmonary NRSA (T35) | — | — | — | — | — | — | 2 | 3 | 3 | — | 0 |
| Pulmonary Faculty Training NRSA (T17) | 24 | 24 | — | — | — | — | — | — | — | — | — |
| Off-Quarter Professional Student Training NRSA (T34, T35) | 79 | 108 | 115 | 122 | 115 | 144 | 136 | 127 | 132 | 148 | 79 |
| Minority Access to Research Career Visiting Professors for Minority Institutions (T36) | — | — | — | — | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
| Subtotal, Training Grants | 1,300 | 1,409 | 1,400 | 1,416 | 1,469 | 1,499 | 1,445 | 1,473 | 1,437 | 1,440 | 1,305 |
| **Total, Training Programs** | **1,541** | **1,634** | **1,602** | **1,626** | **1,688** | **1,709** | **1,633** | **1,666** | **1,655** | **1,628** | **1,519** |

*Recommended positions.

## Number of Awards* in NHLBI Research Career Programs: Fiscal Years 1980-1990

| Program | Fiscal Year<br>1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Special Emphasis Research Career Award (K01)† | 7 | 8 | 8 | 3 | 2 | 3 | 1 | — | — | — | — |
| Research Career Development Award (K04) | 166 | 163 | 155 | 137 | 135 | 126 | 113 | 103 | 103 | 92 | 74 |
| Research Career Award (K06) | 21 | 21 | 20 | 18 | 17 | 15 | 15 | 11 | 11 | 11 | 9 |
| Preventive Cardiology Academic Award (K07) | 11 | 14 | 18 | 26 | 19 | 27 | 18 | 25 | 20 | 22 | 22 |
| Pulmonary Academic Award (K07) | 28 | 23 | 20 | 21 | 17 | 11 | 8 | 4 | — | — | — |
| Preventive Pulmonary Academic Award (K07) | — | — | — | — | — | — | — | 5 | 8 | 12 | 16 |
| Transfusion Medicine Academic Award (K07) | — | — | — | 5 | 12 | 18 | 21 | 25 | 23 | 20 | 18 |
| Pulmonary Faculty Development Award (K08) | 26 | 24 | 17 | 8 | 4 | — | 1 | — | — | — | — |
| Clinical Investigator Award (K08) | 34 | 56 | 77 | 96 | 116 | 123 | 140 | 157 | 146 | 135 | 141 |
| Physician Scientist Award (K11) | — | — | — | — | 9 | 28 | 45 | 59 | 74 | 77 | 90 |
| Minority School Faculty Development Award (K14) | — | — | — | — | — | 5 | 10 | 18 | 21 | 22 | 22 |
| **Total** | **293** | **309** | **315** | **314** | **331** | **356** | **372** | **407** | **406** | **391** | **392** |

*Funded positions. The number of awards may not agree with other tables due to the method of counting supplements.

†Diabetes and heart disease.

## Obligations for NHLBI Research Career Programs: Fiscal Years 1980-1990

(Dollars in Thousands)

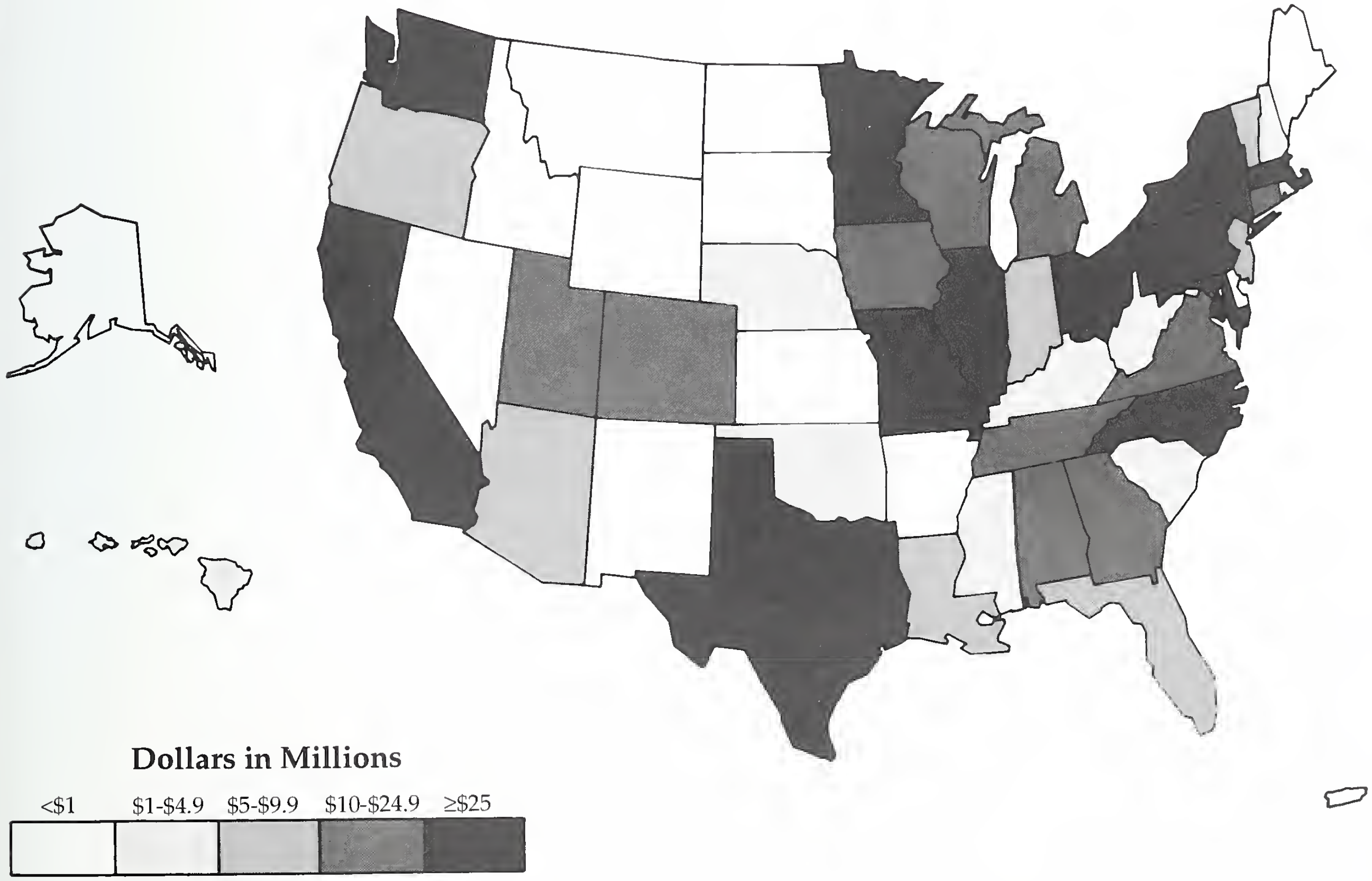
| Program | Fiscal Year<br>1980 | 1981 | 1982 | 1983 | 1984 | 1985* | 1986 | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Special Emphasis Research Career Award (K01)† | 314 | 416 | 413 | 153 | 107 | 218 | 73 | — | — | — | — |
| Research Career Development Award (K04) | 6,135 | 6,253 | 5,998 | 5,299 | 5,376 | 6,568 | 5,914 | 5,377 | 5,376 | 4,859 | 4,609 |
| Research Career Award (K06) | 682 | 685 | 653 | 574 | 557 | 496 | 469 | 363 | 364 | 331 | 303 |
| Preventive Cardiology Academic Award (K07) | 797 | 1,121 | 1,405 | 2,104 | 1,671 | 2,841 | 1,962 | 2,805 | 2,303 | 2,618 | 2,526 |
| Pulmonary Academic Award (K07) | 1,222 | 1,032 | 908 | 1,025 | 895 | 690 | 531 | 309 | — | — | — |
| Preventive Pulmonary Academic Award (K07) | — | — | — | — | — | — | — | 422 | 663 | 984 | 1,301 |
| Transfusion Medicine Academic Award (K07) | — | — | — | 284 | 669 | 1,296 | 1,584 | 1,953 | 1,916 | 1,719 | 1,590 |
| Pulmonary Faculty Development Award (K08) | 876 | 724 | 528 | 253 | 126 | 28 | 53 | — | — | — | — |
| Clinical Investigator Award (K08) | 1,323 | 2,508 | 3,444 | 4,478 | 5,678 | 7,821 | 8,731 | 9,766 | 8,913 | 8,445 | 8,860 |
| Physician Scientist Award (K11) | — | — | — | — | 521 | 1,860 | 3,059 | 4,074 | 5,146 | 5,328 | 6,376 |
| Minority School Faculty Development Award (K14) | — | — | — | — | — | 284 | 558 | 1,012 | 1,256 | 1,280 | 1,334 |
| **Total** | **$11,349** | **$12,739** | **$13,349** | **$14,170** | **$15,600** | **$22,102** | **$22,934** | **$26,081** | **$25,937** | **$25,564** | **$26,899** |

*Salary ceiling on Research Career Awards increased from $30,000 to $40,000.

†Diabetes and heart disease.

# 14. Geographic Distribution of Awards, Fiscal Year 1990

## U.S. Geographic Distribution of Awards by State, Fiscal Year 1990



## Geographic Distribution of Awards by State or Country, Fiscal Year 1990*

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Alabama** | | | | | | | | |
| Alabama State Department of Public Health | 1 | 34,956 | — | — | — | — | 1 | 34,956 |
| Baptist Medical Centers | 1 | 156,380 | 1 | 156,380 | — | — | — | — |
| Oakwood College | 0 | 3,780 | — | — | 0 | 3,780 | — | — |
| Southern Research Institute | 1 | 100,047 | 1 | 100,047 | — | — | — | — |
| Tuskegee University | 2 | 171,392 | 2 | 171,392 | — | — | — | — |
| University of Alabama at Birmingham | 65 | 15,266,000 | 55 | 11,246,084 | 6 | 742,016 | 4 | 3,277,900 |
| University of South Alabama | 15 | 2,689,726 | 12 | 2,396,473 | 2 | 60,400 | 1 | 232,853 |
| **Total, Alabama** | **85** | **18,422,281** | **71** | **14,070,376** | **8** | **806,196** | **6** | **3,545,709** |
| **Alaska** | | | | | | | | |
| University of Alaska, Fairbanks | 1 | 86,096 | 1 | 86,096 | — | — | — | — |
| **Total, Alaska** | **1** | **86,096** | **1** | **86,096** | **—** | **—** | **—** | **—** |
| **Arizona** | | | | | | | | |
| Northern Arizona University | 1 | 81,721 | 1 | 81,721 | — | — | — | — |
| University of Arizona | 21 | 5,682,129 | 18 | 5,363,063 | 3 | 319,066 | — | — |
| **Total, Arizona** | **22** | **5,763,850** | **19** | **5,444,784** | **3** | **319,066** | **—** | **—** |
| **Arkansas** | | | | | | | | |
| North Little Rock Health Department | 1 | 43,343 | — | — | — | — | 1 | 43,343 |
| University of Arkansas for Medical Sciences, Little Rock | 4 | 291,871 | 3 | 263,764 | — | — | 1 | 28,107 |
| **Total, Arkansas** | **5** | **335,214** | **3** | **263,764** | **—** | **—** | **2** | **71,450** |
| **California** | | | | | | | | |
| Adelphi Technology | 1 | 249,999 | 1 | 249,999 | — | — | — | — |
| Alta Bates Hospital | 1 | 22,026 | — | — | — | — | 1 | 22,026 |
| American Institutes for Research | 1 | 392,616 | 1 | 392,616 | — | — | — | — |
| Beckman Research Institute/City of Hope | 1 | 250,637 | 1 | 250,637 | — | — | — | — |
| California Biotechnology, Inc. | 2 | 294,800 | 2 | 294,800 | — | — | — | — |
| California Institute of Technology | 2 | 512,099 | 2 | 512,099 | — | — | — | — |
| California State University, Fullerton | 0 | 42,117 | 0 | 42,117 | — | — | — | — |
| California State University, Los Angeles | 0 | 141,612 | 0 | 141,612 | — | — | — | — |
| Cedars-Sinai Medical Center | 6 | 1,214,853 | 5 | 840,092 | — | — | 1 | 374,761 |
| Charles R. Drew University of Medicine and Science | 3 | 505,216 | 2 | 340,590 | 1 | 164,626 | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **California (continued)** | | | | | | | | |
| Children's Hospital Medical Center of Northern California—Oakland | 6 | 711,972 | 4 | 596,104 | — | — | 2 | 115,868 |
| Children's Hospital of Los Angeles | 2 | 470,987 | 2 | 470,987 | — | — | — | — |
| City of Hope National Medical Center | 1 | 178,828 | 1 | 178,828 | — | — | — | — |
| Clonetics Corporation | 1 | 26,795 | 1 | 26,795 | — | — | — | — |
| Cor Therapeutics, Inc. | 5 | 466,517 | 5 | 466,517 | — | — | — | — |
| Corvas, Inc. | 1 | 243,439 | 1 | 243,439 | — | — | — | — |
| Ernest Gallo Clinic and Research Center | 2 | 122,800 | 2 | 122,800 | — | — | — | — |
| Genetic Profiles | 1 | 49,648 | 1 | 49,648 | — | — | — | — |
| Imatron, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| J. David Gladstone Foundation | 9 | 2,896,937 | 7 | 2,847,937 | 2 | 49,000 | — | — |
| Kaiser Foundation Hospitals | 1 | 336,348 | 1 | 336,348 | — | — | — | — |
| Kaiser Foundation Research Institute | 6 | 2,424,084 | 5 | 1,434,847 | — | — | 1 | 989,237 |
| La Jolla Cancer Research Foundation | 2 | 361,561 | 2 | 361,561 | — | — | — | — |
| Let's Eat | 1 | 48,969 | 1 | 48,969 | — | — | — | — |
| Lidak Biopharmaceuticals | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Loma Linda University | 1 | 90,659 | 1 | 90,659 | — | — | — | — |
| Los Angeles County Harbor-UCLA Medical Center | 6 | 728,835 | 6 | 728,835 | — | — | — | — |
| Los Angeles County-University of Southern California Medical Center | 2 | 220,938 | 2 | 220,938 | — | — | — | — |
| Luxtron Corporation | 1 | 49,984 | 1 | 49,984 | — | — | — | — |
| Medical Research Institute of San Francisco | 3 | 665,597 | 2 | 377,282 | — | — | 1 | 288,315 |
| Nimbus, Inc. | 3 | 979,088 | 3 | 979,088 | — | — | — | — |
| Novacor Medical Corporation | 1 | 1,843,450 | — | — | — | — | 1 | 1,843,450 |
| Palo Alto Medical Foundation Research Institute | 3 | 279,513 | 3 | 279,513 | — | — | — | — |
| Salk Institute for Biological Studies | 4 | 531,344 | 3 | 510,344 | 1 | 21,000 | — | — |
| San Diego State University | 2 | 874,579 | 2 | 874,579 | — | — | — | — |
| Scripps Clinic and Research Foundation | 31 | 8,446,299 | 28 | 8,135,302 | 3 | 310,997 | — | — |
| Society for the Advancement of Chicanos/Native Americans | 0 | 5,000 | — | — | 0 | 5,000 | — | — |
| Society of Magnetic Resonance Medicine | 1 | 7,000 | 1 | 7,000 | — | — | — | — |
| Specialty Laboratories, Inc. | 1 | 92,193 | 1 | 92,193 | — | — | — | — |
| SRI International | 3 | 486,626 | 3 | 486,626 | — | — | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **California (continued)** | | | | | | | | |
| Stanford University | 38 | 14,362,612 | 35 | 13,989,070 | 3 | 373,542 | — | — |
| Syntex (USA), Inc.-Research Division | 1 | 46,269 | 1 | 46,269 | — | — | — | — |
| Systemix, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | -- |
| Telios Pharmaceuticals, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Tini Alloy Company | 1 | 48,898 | 1 | 48,898 | — | — | — | — |
| U.S. Veterans Administration Medical Center, Palo Alto | 1 | 89,460 | 1 | 89,460 | — | — | — | — |
| University of California-Lawrence Berkeley Laboratory | 12 | 4,514,109 | 10 | 4,222,467 | 2 | 291,642 | — | — |
| University of California, Berkeley | 3 | 868,551 | 1 | 220,169 | 1 | 184,275 | 1 | 464,107 |
| University of California, Davis | 35 | 5,042,475 | 30 | 4,384,246 | 3 | 72,500 | 2 | 585,729 |
| University of California, Irvine | 9 | 1,873,131 | 7 | 1,196,255 | — | — | 2 | 676,876 |
| University of California, Los Angeles | 46 | 13,322,879 | 41 | 11,273,917 | 3 | 659,050 | 2 | 1,389,912 |
| University of California, Riverside | 2 | 292,940 | 2 | 292,940 | — | — | — | — |
| University of California, San Diego | 68 | 19,253,479 | 55 | 17,379,466 | 12 | 1,291,246 | 1 | 582,767 |
| University of California, San Francisco | 108 | 30,623,048 | 87 | 25,990,362 | 19 | 2,115,556 | 2 | 2,517,130 |
| University of California, Santa Barbara | 1 | 83,292 | 1 | 83,292 | — | — | — | — |
| University of Southern California | 16 | 14,385,495 | 14 | 4,124,495 | 1 | 21,000 | 1 | 10,240,000 |
| University of the Pacific | 3 | 330,146 | 3 | 330,146 | — | — | — | — |
| Western Consortium for Public Health | 1 | 260,332 | 1 | 260,332 | — | — | — | — |
| **Total, California** | **466** | **132,863,081** | **397** | **107,213,469** | **51** | **5,559,434** | **18** | **20,090,178** |
| **Colorado** | | | | | | | | |
| Colorado State University | 2 | 302,596 | 2 | 302,596 | — | — | — | — |
| National Jewish Center for Immunology/Respiratory Medicine | 14 | 4,354,143 | 13 | 4,151,157 | 1 | 202,986 | — | — |
| Tetrad Corporation | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| University of Colorado at Boulder | 5 | 536,949 | 5 | 536,949 | — | — | — | — |
| University of Colorado Health Sciences Center | 30 | 5,861,564 | 28 | 5,161,831 | 2 | 699,733 | — | — |
| **Total, Colorado** | **52** | **11,105,252** | **49** | **10,202,533** | **3** | **902,719** | **—** | **—** |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Connecticut** | | | | | | | | |
| American National Red Cross, Connecticut | 1 | 142,317 | 1 | 142,317 | — | — | — | — |
| Connecticut College | 1 | 112,766 | 1 | 112,766 | — | — | — | — |
| John B. Pierce Foundation Laboratory, Inc. | 6 | 1,009,490 | 6 | 1,009,490 | — | — | — | — |
| Symbiotech, Inc. | 1 | 49,826 | 1 | 49,826 | — | — | — | — |
| University of Connecticut Health Center | 10 | 1,886,292 | 9 | 1,819,450 | 1 | 66,842 | — | — |
| University of Connecticut, Storrs | 0 | 37,844 | 0 | 37,844 | — | — | — | — |
| Yale University | 43 | 6,855,654 | 36 | 6,096,494 | 5 | 464,153 | 2 | 295,007 |
| **Total, Connecticut** | **62** | **10,094,189** | **54** | **9,268,187** | **6** | **530,995** | **2** | **295,007** |
| **Delaware** | | | | | | | | |
| University of Delaware | 3 | 213,013 | 3 | 213,013 | — | — | — | — |
| **Total, Delaware** | **3** | **213,013** | **3** | **213,013** | **—** | **—** | **—** | **—** |
| **District of Columbia** | | | | | | | | |
| American National Red Cross | 13 | 6,782,937 | 12 | 1,723,715 | — | — | 1 | 5,059,222 |
| Children's Hospital National Medical Center | 4 | 246,448 | 3 | 234,256 | — | — | 1 | 12,192 |
| George Washington University | 10 | 2,270,197 | 9 | 1,975,048 | — | — | 1 | 295,149 |
| Georgetown University | 16 | 3,803,319 | 15 | 3,016,782 | — | — | 1 | 786,537 |
| Howard University | 5 | 783,153 | 4 | 720,951 | — | — | 1 | 62,202 |
| Market Facts, Inc. | 1 | 15,000 | — | — | — | — | 1 | 15,000 |
| Medlantic Healthcare Group | 1 | 300,000 | — | — | — | — | 1 | 300,000 |
| Medlantic Research Foundation | 3 | 635,649 | 3 | 635,649 | — | — | — | — |
| National Academy of Sciences | 2 | 333,198 | — | — | — | — | 2 | 333,198 |
| U.S. Department of Health and Human Services | 1 | 201,087 | — | — | — | — | 1 | 201,087 |
| U.S. Veterans Administration Medical Center | 1 | 189,863 | — | — | — | — | 1 | 189,863 |
| University of the District of Columbia | 0 | 42,677 | 0 | 42,677 | — | — | — | — |
| **Total, District of Columbia** | **57** | **15,603,528** | **46** | **8,349,078** | **—** | **—** | **11** | **7,254,450** |
| **Florida** | | | | | | | | |
| Abela Laser Systems | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Bethune-Cookman College | 0 | 108,908 | 0 | 108,908 | — | — | — | — |
| Florida Hospital Association Information Systems | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Florida State Department of Health and Rehabilitation Services | 1 | 48,231 | — | — | — | — | 1 | 48,231 |
| Florida State University | 1 | 105,218 | 1 | 105,218 | — | — | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Florida (continued)** | | | | | | | | |
| Mount Sinai Medical Center, Miami Beach | 3 | 332,959 | 3 | 332,959 | — | — | — | — |
| University of Florida | 23 | 2,650,425 | 19 | 2,361,577 | 3 | 110,228 | 1 | 178,620 |
| University of Miami | 24 | 4,656,084 | 22 | 4,408,042 | 1 | 191,260 | 1 | 56,782 |
| University of Miami | 3 | 808,709 | 1 | 300,434 | 1 | 225,634 | 1 | 282,641 |
| University of South Florida | 4 | 511,238 | 4 | 511,238 | — | — | — | — |
| **Total, Florida** | **61** | **9,321,772** | **52** | **8,228,376** | **5** | **527,122** | **4** | **566,274** |
| **Georgia** | | | | | | | | |
| Albany State College | 0 | 54,685 | 0 | 54,685 | — | — | — | — |
| Athens Research and Technology, Inc. | 1 | 241,165 | 1 | 241,165 | — | — | — | — |
| Emory University | 32 | 7,817,844 | 27 | 7,129,423 | 3 | 95,500 | 2 | 592,921 |
| Evans County Health Department | 1 | 42,432 | 1 | 42,432 | — | — | — | — |
| Fort Valley State College | 1 | 51,695 | 1 | 51,695 | — | — | — | — |
| Georgia Institute of Technology | 4 | 390,631 | 3 | 369,631 | 1 | 21,000 | — | — |
| Georgia State Department of Human Resources | 1 | 48,943 | — | — | — | — | 1 | 48,943 |
| Medical College of Georgia | 18 | 3,209,353 | 17 | 3,135,387 | — | — | 1 | 73,966 |
| Mercer University, Macon | 1 | 52,704 | 1 | 52,704 | — | — | — | — |
| Morehouse School of Medicine | 2 | 403,630 | 2 | 396,630 | 0 | 7,000 | — | — |
| U.S. Centers for Disease Control | 4 | 817,000 | — | — | — | — | 4 | 817,000 |
| University of Georgia | 6 | 696,178 | 6 | 696,178 | — | — | — | — |
| **Total, Georgia** | **71** | **13,826,260** | **59** | **12,169,930** | **4** | **123,500** | **8** | **1,532,830** |
| **Hawaii** | | | | | | | | |
| Kapiolani Women's and Children's Medical Center | 1 | 74,694 | 1 | 74,694 | — | — | — | — |
| Kuakini Medical Center | 1 | 2,540,130 | — | — | — | — | 1 | 2,540,130 |
| Pacific Health Research Institute | 1 | 460,255 | — | — | — | — | 1 | 460,255 |
| University of Hawaii at Manoa | 2 | 193,799 | 1 | 87,041 | 1 | 106,758 | — | — |
| **Total, Hawaii** | **5** | **3,268,878** | **2** | **161,735** | **1** | **106,758** | **2** | **3,000,385** |
| **Illinois** | | | | | | | | |
| Abbott Laboratories | 2 | 339,920 | 2 | 339,920 | — | — | — | — |
| Bio-Imaging Research, Inc. | 1 | 49,682 | 1 | 49,682 | — | — | — | — |
| Chicago State University | 0 | 52,303 | 0 | 52,303 | — | — | — | — |
| Evanston Hospital | 0 | 51,106 | 0 | 51,106 | — | — | — | — |
| Illinois Institute of Technology | 4 | 487,751 | 4 | 487,751 | — | — | — | — |
| Loyola University Medical Center | 9 | 1,401,866 | 9 | 1,401,866 | — | — | — | — |
| Loyola University of Chicago | 1 | 127,390 | 1 | 127,390 | — | — | — | — |
| Michael Reese Hospital and Medical Center, Chicago | 4 | 644,839 | 4 | 644,839 | — | — | — | — |
| Northwestern University | 10 | 1,220,530 | 9 | 1,192,530 | 1 | 28,000 | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Illinois (continued)** | | | | | | | | |
| Northwestern University | 23 | 4,484,643 | 19 | 3,069,586 | 2 | 49,000 | 2 | 1,366,057 |
| Rush University | 1 | 151,044 | 1 | 151,044 | — | — | — | — |
| Rush-Presbyterian-St. Lukes Medical Center | 11 | 1,374,028 | 10 | 1,134,028 | — | — | 1 | 240,000 |
| Southern Illinois University, Carbondale | 1 | 97,304 | 1 | 97,304 | — | — | — | — |
| Southern Illinois University School of Medicine | 2 | 117,875 | 2 | 117,875 | — | — | — | — |
| U.S. Veterans Administration Medical Center, Hines | 1 | 94,656 | — | — | — | — | 1 | 94,656 |
| University of Chicago | 44 | 13,142,512 | 37 | 11,625,623 | 7 | 1,516,889 | — | — |
| University of Health Sciences/ Chicago Medical School | 2 | 322,945 | 2 | 322,945 | — | — | — | — |
| University of Illinois at Chicago | 24 | 3,676,950 | 17 | 2,918,205 | 3 | 222,900 | 4 | 535,845 |
| University of Illinois, Urbana-Champaign | 9 | 961,054 | 9 | 961,054 | — | — | — | — |
| **Total, Illinois** | **149** | **28,798,398** | **128** | **24,745,051** | **13** | **1,816,789** | **8** | **2,236,558** |
| **Indiana** | | | | | | | | |
| De Paul University | 1 | 348,944 | 1 | 348,944 | — | — | — | — |
| Endotech Corporation | 1 | 49,762 | 1 | 49,762 | — | — | — | — |
| Indiana State Board of Health | 1 | 50,000 | — | — | — | — | 1 | 50,000 |
| Indiana University-Purdue University at Indianapolis | 28 | 4,898,559 | 25 | 4,570,285 | 3 | 328,274 | — | — |
| Indiana University, Bloomington | 2 | 148,041 | 2 | 148,041 | — | — | — | — |
| Purdue University, West Lafayette | 4 | 409,852 | 3 | 375,352 | 1 | 34,500 | — | — |
| University of Notre Dame | 2 | 501,965 | 2 | 501,965 | — | — | — | — |
| **Total, Indiana** | **39** | **6,407,123** | **34** | **5,994,349** | **4** | **362,774** | **1** | **50,000** |
| **Iowa** | | | | | | | | |
| University of Iowa | 76 | 18,570,684 | 58 | 16,930,679 | 18 | 1,640,005 | — | — |
| **Total, Iowa** | **76** | **18,570,684** | **58** | **16,930,679** | **18** | **1,640,005** | — | — |
| **Kansas** | | | | | | | | |
| Kansas State University | 1 | 77,274 | 1 | 77,274 | — | — | — | — |
| University of Kansas College of Health Sciences and Hospital | 5 | 553,171 | 5 | 553,171 | — | — | — | — |
| University of Kansas, Lawrence | 2 | 179,148 | 2 | 179,148 | — | — | — | — |
| Wichita State University | 1 | 83,644 | 1 | 83,644 | — | — | — | — |
| **Total, Kansas** | **9** | **893,237** | **9** | **893,237** | — | — | — | — |
| **Kentucky** | | | | | | | | |
| Kentucky State Department of Mental Health | 1 | 49,900 | — | — | — | — | 1 | 49,900 |
| University of Kentucky | 20 | 3,364,133 | 19 | 3,084,402 | — | — | 1 | 279,731 |
| University of Louisville | 1 | 102,952 | 1 | 102,952 | — | — | — | — |
| **Total, Kentucky** | **22** | **3,516,985** | **20** | **3,187,354** | — | — | **2** | **329,631** |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Louisiana** | | | | | | | | |
| Children's Hospital, New Orleans | 0 | 525,593 | 0 | 525,593 | — | — | — | — |
| Louisiana State Preventative/ Public Health Service | 1 | 33,600 | — | — | — | — | 1 | 33,600 |
| Louisiana State University Agricultural and Mechanical College, Baton Rouge | 2 | 331,492 | 2 | 331,492 | — | — | — | — |
| Louisiana State University Medical Center, New Orleans | 12 | 4,395,508 | 11 | 4,282,044 | 1 | 113,464 | — | — |
| Louisiana State University Medical Center, Shreveport | 5 | 400,179 | 5 | 400,179 | — | — | — | — |
| Southern University Agricultural and Mechanical College, Baton Rouge | 0 | 3,780 | 0 | 3,780 | — | — | — | — |
| Tulane University of Louisiana | 7 | 1,641,682 | 6 | 1,607,182 | 1 | 34,500 | — | — |
| Xavier University of Louisiana | 1 | 60,260 | 1 | 60,260 | — | — | — | — |
| **Total, Louisiana** | **28** | **7,392,094** | **25** | **7,206,750** | **2** | **151,744** | **1** | **33,600** |
| **Maine** | | | | | | | | |
| Jackson Laboratory | 2 | 466,694 | 2 | 466,694 | — | — | — | — |
| **Total, Maine** | **2** | **466,694** | **2** | **466,694** | **—** | **—** | **—** | **—** |
| **Maryland** | | | | | | | | |
| Advanced Bioscience Laboratories, Inc. | 1 | 211,238 | — | — | — | — | 1 | 211,238 |
| American National Red Cross of Central Maryland | 1 | 214,129 | 1 | 214,129 | — | — | — | — |
| American Society for Cell Biology | 0 | 3,000 | — | — | — | — | 0 | 3,000 |
| American Society of Human Genetics | 0 | 5,000 | 0 | 5,000 | — | — | — | — |
| Biophysical Society | 0 | 4,000 | 0 | 4,000 | — | — | — | — |
| Biotech Research Laboratories, Inc. | 1 | 211,459 | 1 | 211,459 | — | — | — | — |
| Birch and Davis Associates, Inc. | 1 | 71,004 | — | — | — | — | 1 | 71,004 |
| Federation of American Societies for Experimental Biology | 2 | 20,680 | 2 | 20,680 | — | — | — | — |
| Henry M. Jackson Foundation for the Advancement of Military Medicine | 1 | 20,633 | 1 | 20,633 | — | — | — | — |
| Heritage Medical Products | 1 | 49,382 | 1 | 49,382 | — | — | — | — |
| Infrared Fiber Systems, Inc. | 1 | 176,410 | 1 | 176,410 | — | — | — | — |
| Johns Hopkins University | 98 | 22,027,734 | 79 | 17,045,239 | 13 | 1,993,075 | 6 | 2,989,420 |
| Maryland Medical Research Institute | 6 | 4,157,689 | 4 | 2,691,142 | — | — | 2 | 1,466,547 |
| Mayatech Corporation | 2 | 625,468 | — | — | — | — | 2 | 625,468 |
| Prospect Associates, Ltd. | 2 | 367,485 | — | — | — | — | 2 | 367,485 |
| Technical Resources, Inc. | 1 | 199,033 | — | — | — | — | 1 | 199,033 |
| U.S. Agricultural Research Center | 1 | 200,000 | — | — | — | — | 1 | 200,000 |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Maryland (continued)** | | | | | | | | |
| U.S. Alcohol, Drug Abuse, and Mental Health Administration | 1 | 154,463 | 1 | 154,463 | — | — | — | — |
| U.S. Bureau of the Census | 2 | 1,112,000 | — | — | — | — | 2 | 1,112,000 |
| U.S. Food and Drug Administration | 1 | 148,000 | — | — | — | — | 1 | 148,000 |
| U.S. Health Resources and Services Administration | 1 | 100,000 | — | — | — | — | 1 | 100,000 |
| U.S. Human Nutrition Information Service | 1 | 75,000 | — | — | — | — | 1 | 75,000 |
| U.S. National Center for Health Statistics | 1 | 342,000 | — | — | — | — | 1 | 342,000 |
| U.S. National Heart, Lung, and Blood Institute | 2 | 60,250 | — | — | 2 | 60,250 | — | — |
| U.S. National Institutes of Health | 2 | 40,020 | — | — | 1 | 30,750 | 1 | 9,270 |
| U.S. PHS Public Advisory Groups | 4 | 3,599,000 | 4 | 3,599,000 | — | — | — | — |
| U.S. Veterans Administration Medical Center, Perry Point | 3 | 1,142,973 | — | — | — | — | 3 | 1,142,973 |
| University of Maryland, Baltimore County Campus | 1 | 151,772 | 1 | 151,772 | — | — | — | — |
| University of Maryland, Baltimore Professional School | 25 | 5,050,147 | 23 | 4,644,016 | 1 | 42,120 | 1 | 364,011 |
| University of Maryland, College Park Campus | 1 | 95,983 | 1 | 95,983 | — | — | — | — |
| University Research Corporation | 1 | 908,176 | — | — | — | — | 1 | 908,176 |
| Westat, Inc. | 1 | 509,310 | — | — | — | — | 1 | 509,310 |
| **Total, Maryland** | **166** | **42,053,438** | **120** | **29,083,308** | **17** | **2,129,195** | **29** | **10,840,935** |
| **Massachusetts** | | | | | | | | |
| A/G Technology Corporation | 0 | 10,000 | 0 | 10,000 | — | — | — | — |
| Abiomed, Inc. | 5 | 1,231,129 | 4 | 198,638 | — | — | 1 | 1,032,491 |
| Beth Israel Hospital, Boston | 24 | 3,774,183 | 22 | 3,626,134 | 2 | 148,049 | — | — |
| Boston Biomedical Research Institute | 3 | 824,894 | 3 | 824,894 | — | — | — | — |
| Boston City Hospital | 1 | 1,759,072 | 1 | 1,759,072 | — | — | — | — |
| Boston University | 45 | 13,930,712 | 38 | 12,234,531 | 6 | 1,327,181 | 1 | 369,000 |
| Brandeis University | 3 | 237,061 | 2 | 209,061 | 1 | 28,000 | — | — |
| Brigham and Women's Hospital | 72 | 22,252,674 | 58 | 20,199,521 | 14 | 2,053,153 | — | — |
| Candela Laser Corporation | 1 | 49,462 | 1 | 49,462 | — | — | — | — |
| Center for Blood Research | 5 | 2,802,630 | 5 | 2,802,630 | — | — | — | — |
| Children's Hospital, Boston | 23 | 5,098,128 | 20 | 3,685,647 | 2 | 558,644 | 1 | 853,837 |
| Covalent Associates, Inc. | 1 | 248,101 | 1 | 248,101 | — | — | — | — |
| Creative Biomolecules, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Massachusetts (continued)** | | | | | | | | |
| Dana-Farber Cancer Institute | 5 | 656,162 | 4 | 635,162 | 1 | 21,000 | — | — |
| EIC Laboratories, Inc. | 1 | 49,959 | 1 | 49,959 | — | — | — | — |
| Giner, Inc. | 1 | 251,521 | 1 | 251,521 | — | — | — | — |
| Harbor Medical Devices, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Harvard University | 35 | 9,971,223 | 24 | 9,085,553 | 11 | 885,670 | — | — |
| Harvard University | 2 | 529,825 | 2 | 529,825 | — | — | — | — |
| Integrated Genetics, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Joslin Diabetes Center | 1 | 128,358 | 1 | 128,358 | — | — | — | — |
| Massachusetts General Hospital | 46 | 13,470,106 | 42 | 12,865,957 | 4 | 604,149 | — | — |
| Massachusetts Institute of Technology | 11 | 4,708,556 | 10 | 4,680,556 | 1 | 28,000 | — | — |
| Microwave Medical Systems, Inc. | 1 | 216,043 | 1 | 216,043 | — | — | — | — |
| New England Deaconess Hospital | 8 | 3,667,136 | 7 | 3,467,149 | — | — | 1 | 199,987 |
| New England Medical Center Hospitals, Inc. | 19 | 4,156,659 | 13 | 3,527,609 | 5 | 409,006 | 1 | 220,044 |
| New England Research Institute, Inc. | 3 | 1,355,786 | 1 | 354,354 | — | — | 2 | 1,001,432 |
| Northeastern University | 2 | 221,769 | 2 | 221,769 | — | — | — | — |
| Principle Technologies | 1 | 49,988 | 1 | 49,988 | — | — | — | — |
| Science Research Laboratory, Inc. | 1 | 258,044 | 1 | 258,044 | — | — | — | — |
| Sepracor, Inc. | 1 | 167,265 | 1 | 167,265 | — | — | — | — |
| St. Elizabeth's Hospital of Boston | 5 | 1,755,549 | 5 | 1,755,549 | — | — | — | — |
| Thermal Technologies, Inc. | 3 | 488,738 | 3 | 488,738 | — | — | — | — |
| Tufts University | 8 | 1,130,514 | 8 | 1,130,514 | — | — | — | — |
| University Hospital, Boston | 8 | 1,430,380 | 8 | 1,430,380 | — | — | — | — |
| University of Lowell | 3 | 320,060 | 3 | 320,060 | — | — | — | — |
| University of Massachusetts, Amherst | 1 | 140,100 | 1 | 140,100 | — | — | — | — |
| University of Massachusetts Medical School | 22 | 4,291,074 | 20 | 3,907,151 | 1 | 54,000 | 1 | 329,923 |
| Whalen Biomedical, Inc. | 3 | 583,220 | 3 | 583,220 | — | — | — | — |
| Whitehead Institute for Biomedical Research | 1 | 324,640 | 1 | 324,640 | — | — | — | — |
| Worcester Polytechnic Institute | 1 | 5,000 | 1 | 5,000 | — | — | — | — |
| **Total, Massachusetts** | **379** | **102,695,721** | **323** | **92,572,155** | **48** | **6,116,852** | **8** | **4,006,714** |
| **Michigan** | | | | | | | | |
| American National Red Cross, Southeast Michigan | 1 | 99,026 | 1 | 99,026 | — | — | — | — |
| Henry Ford Hospital | 8 | 3,547,333 | 5 | 1,884,048 | — | — | 3 | 1,663,285 |
| Michigan State University | 19 | 2,173,919 | 16 | 1,639,412 | 2 | 354,525 | 1 | 179,982 |
| University of Michigan at Ann Arbor | 56 | 11,271,113 | 48 | 10,088,562 | 7 | 656,140 | 1 | 526,411 |
| Wayne State University | 21 | 3,286,943 | 19 | 3,231,018 | 2 | 55,925 | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Michigan (continued)** | | | | | | | | |
| Western Michigan University | 1 | 77,285 | 1 | 77,285 | — | — | — | — |
| **Total, Michigan** | **106** | **20,455,619** | **90** | **17,019,351** | **11** | **1,066,590** | **5** | **2,369,678** |
| **Minnesota** | | | | | | | | |
| American Indian Health Care Association | 1 | 214,128 | 1 | 214,128 | — | — | — | — |
| Bio-Metric Systems, Inc. | 3 | 346,364 | 3 | 346,364 | — | — | — | — |
| Mayo Foundation | 30 | 6,874,587 | 26 | 5,912,918 | 3 | 433,966 | 1 | 527,703 |
| U.S. Veterans Administration Medical Center, Minneapolis | 1 | 12,950 | 1 | 12,950 | — | — | — | — |
| University of Minnesota at Duluth | 1 | 8,907 | 1 | 8,907 | — | — | — | — |
| University of Minnesota, Minneapolis-St. Paul | 66 | 23,303,222 | 47 | 17,319,878 | 12 | 976,292 | 7 | 5,007,052 |
| **Total, Minnesota** | **102** | **30,760,158** | **79** | **23,815,145** | **15** | **1,410,258** | **8** | **5,534,755** |
| **Mississippi** | | | | | | | | |
| Alcorn State University | 0 | 77,455 | 0 | 77,455 | — | — | — | — |
| Jackson State University | 1 | 102,906 | — | — | 1 | 102,906 | — | — |
| Mississippi State Department of Health | 1 | 50,958 | — | — | — | — | 1 | 50,958 |
| University of Mississippi | 1 | 142,814 | 1 | 142,814 | — | — | — | — |
| University of Mississippi Medical Center | 19 | 3,575,281 | 15 | 2,503,617 | 2 | 57,250 | 2 | 1,014,414 |
| **Total, Mississippi** | **22** | **3,949,414** | **16** | **2,723,886** | **3** | **160,156** | **3** | **1,065,372** |
| **Missouri** | | | | | | | | |
| Children's Mercy Hospital, Kansas City | 1 | 19,039 | — | — | — | — | 1 | 19,039 |
| Jewish Hospital of St. Louis | 14 | 2,933,987 | 14 | 2,933,987 | — | — | — | — |
| Lincoln University | 0 | 52,442 | 0 | 52,442 | — | — | — | — |
| St. Louis University | 24 | 5,089,410 | 22 | 4,645,449 | — | — | 2 | 443,961 |
| University of Missouri, Columbia | 17 | 2,321,397 | 16 | 2,155,419 | 1 | 165,978 | — | — |
| University of Missouri, Kansas City | 2 | 181,248 | 2 | 181,248 | — | — | — | — |
| Washington University | 72 | 18,379,442 | 61 | 16,459,180 | 9 | 1,804,549 | 2 | 115,713 |
| **Total, Missouri** | **130** | **28,976,965** | **115** | **26,427,725** | **10** | **1,970,527** | **5** | **578,713** |
| **Nebraska** | | | | | | | | |
| Creighton University | 2 | 318,762 | 2 | 318,762 | — | — | — | — |
| University of Nebraska Medical Center | 12 | 969,746 | 12 | 969,746 | — | — | — | — |
| **Total, Nebraska** | **14** | **1,288,508** | **14** | **1,288,508** | — | — | — | — |
| **Nevada** | | | | | | | | |
| University of Nevada, Reno | 5 | 517,888 | 4 | 496,888 | 1 | 21,000 | — | — |
| **Total, Nevada** | **5** | **517,888** | **4** | **496,888** | **1** | **21,000** | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **New Hampshire** | | | | | | | | |
| Dartmouth College | 13 | 2,004,727 | 12 | 1,787,407 | 1 | 217,320 | — | — |
| University of New Hampshire | 3 | 172,551 | 3 | 172,551 | — | — | — | — |
| **Total, New Hampshire** | **16** | **2,177,278** | **15** | **1,959,958** | **1** | **217,320** | **—** | **—** |
| **New Jersey** | | | | | | | | |
| Clinical Immunology Society | 0 | 1,000 | 0 | 1,000 | — | — | — | — |
| Coriell Institute for Medical Research | 1 | 175,311 | 1 | 175,311 | — | — | — | — |
| Deborah Research Institute | 2 | 168,424 | 2 | 168,424 | — | — | — | — |
| Health Enhancement Systems, Inc. | 1 | 49,595 | 1 | 49,595 | — | — | — | — |
| JP Laboratories, Inc. | 1 | 49,920 | 1 | 49,920 | — | — | — | — |
| Overlook Hospital, Summit | 1 | 67,148 | — | — | — | — | 1 | 67,148 |
| Pegasus Technologies, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Princeton University | 2 | 246,138 | 1 | 225,138 | 1 | 21,000 | — | — |
| Rutgers University, New Brunswick | 1 | 90,558 | 1 | 90,558 | — | — | — | — |
| Sensonics, Inc. | 1 | 169,384 | 1 | 169,384 | — | — | — | — |
| Serex | 1 | 30,225 | 1 | 30,225 | — | — | — | — |
| Seton Hall University | 1 | 108,094 | 1 | 108,094 | — | — | — | — |
| University of Medicine and Dentistry of New Jersey, R.W. Johnson Medical School | 14 | 2,179,026 | 12 | 1,967,099 | — | — | 2 | 211,927 |
| University of Medicine and Dentistry of New Jersey, School of Osteopathic Medicine | 1 | 101,672 | 1 | 101,672 | — | — | — | — |
| University of Medicine and Dentistry of New Jersey | 9 | 2,443,300 | 7 | 2,351,856 | 1 | 91,182 | 1 | 262 |
| **Total, New Jersey** | **37** | **5,929,795** | **31** | **5,538,276** | **2** | **112,182** | **4** | **279,337** |
| **New Mexico** | | | | | | | | |
| Lovelace Medical Foundation | 1 | 98,218 | 1 | 98,218 | — | — | — | — |
| New Mexico State University, Las Cruces | 0 | 49,239 | 0 | 49,239 | — | — | — | — |
| U.S. Veterans Administration Medical Center, Albuquerque | 1 | 11,668 | — | — | — | — | 1 | 11,668 |
| University of New Mexico, Albuquerque | 14 | 1,869,638 | 14 | 1,869,638 | — | — | — | — |
| **Total, New Mexico** | **16** | **2,028,763** | **15** | **2,017,095** | **—** | **—** | **1** | **11,668** |
| **New York** | | | | | | | | |
| Albany Medical College of Union University | 11 | 1,568,352 | 9 | 1,214,620 | 2 | 353,732 | — | — |
| American Health Foundation | 1 | 298,687 | 1 | 298,687 | — | — | — | — |
| Anatole J. Sipin Company, Inc. | 1 | 242,000 | 1 | 242,000 | — | — | — | — |
| Associated University-Brookhaven National Laboratory | 1 | 197,406 | 1 | 197,406 | — | — | — | — |
| Behavioral Health Systems, Inc. | 2 | 274,580 | 2 | 274,580 | — | — | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **New York (continued)** | | | | | | | | |
| Beth Israel Medical Center, New York | 2 | 295,436 | 2 | 295,436 | — | — | — | — |
| Bronx Community College | 0 | 119,551 | 0 | 119,551 | — | — | — | — |
| Children's Hospital, Buffalo | 1 | 63,504 | 1 | 63,504 | — | — | — | — |
| City College of New York | 4 | 690,062 | 4 | 690,062 | — | — | — | — |
| Cold Spring Harbor Laboratory | 2 | 155,614 | 1 | 127,614 | 1 | 28,000 | — | — |
| Columbia University, New York | 52 | 17,521,330 | 41 | 15,978,965 | 9 | 905,227 | 2 | 637,138 |
| Cornell University, Ithaca | 6 | 975,250 | 5 | 883,358 | 1 | 91,892 | — | — |
| Cornell University Medical Center | 41 | 12,534,078 | 35 | 12,036,266 | 6 | 497,812 | — | — |
| Health Science Center at Brooklyn | 15 | 2,009,129 | 11 | 1,382,041 | — | — | 4 | 627,088 |
| Health Science Center at Syracuse | 11 | 2,919,086 | 10 | 2,612,470 | — | — | 1 | 306,616 |
| Hemex, Inc. | 1 | 215,012 | 1 | 215,012 | — | — | — | — |
| Inair, Ltd. | 1 | 49,788 | 1 | 49,788 | — | — | — | — |
| Institute for Basic Research in Developmental Disability | 1 | 76,932 | 1 | 76,932 | — | — | — | — |
| Interfaith Medical Center, Brooklyn | 1 | 113,646 | — | — | — | — | 1 | 113,646 |
| Intersystems, Inc. | 1 | 49,998 | 1 | 49,998 | — | — | — | — |
| Juvenile Diabetes Foundation International | 0 | 3,000 | 0 | 3,000 | — | — | — | — |
| Long Island Jewish Medical Center | 2 | 78,119 | 2 | 78,119 | — | — | — | — |
| Mary Imogene Bassett Hospital | 4 | 961,848 | 3 | 782,145 | 1 | 179,703 | — | — |
| Masonic Medical Research Laboratory, Inc. | 2 | 408,843 | 2 | 408,843 | — | — | — | — |
| Montefiore Medical Center, Bronx | 9 | 2,665,888 | 9 | 2,665,888 | — | — | — | — |
| Mount Sinai School of Medicine | 18 | 5,015,165 | 15 | 3,386,808 | 1 | 34,500 | 2 | 1,593,857 |
| New York Academy of Sciences | 1 | 10,489 | 1 | 10,489 | — | — | — | — |
| New York Blood Center | 4 | 889,065 | 4 | 889,065 | — | — | — | — |
| New York Medical College | 21 | 4,323,686 | 19 | 4,114,788 | 1 | 28,000 | 1 | 180,898 |
| New York State Department of Health | 1 | 173,589 | 1 | 173,589 | — | — | — | — |
| New York State Office of Mental Health | 1 | 148,498 | 1 | 148,498 | — | — | — | — |
| New York State Psychiatric Institute | 1 | 54,674 | 1 | 54,674 | — | — | — | — |
| New York University | 11 | 2,248,071 | 10 | 2,030,999 | 1 | 217,072 | — | — |
| North Shore University Hospital | 2 | 288,481 | 2 | 288,481 | — | — | — | — |
| Oncogene Science, Inc. | 2 | 291,056 | 2 | 291,056 | — | — | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | **No.** | **Dol.** | **No.** | **Dol.** | **No.** | **Dol.** | **No.** | **Dol.** |
| **New York (continued)** | | | | | | | | |
| Presbyterian Hospital in New York | 1 | 720,372 | — | — | — | — | 1 | 720,372 |
| Public Health Research Institute of the City of New York | 1 | 318,875 | 1 | 318,875 | — | — | — | — |
| Quantronix Corporation | 1 | 44,753 | 1 | 44,753 | — | — | — | — |
| Queens College | 1 | 202,375 | 1 | 202,375 | — | — | — | — |
| Rensselaer Polytechnic Institute | 1 | 128,678 | 1 | 128,678 | — | — | — | — |
| Rockefeller University | 12 | 1,863,760 | 10 | 1,814,760 | 2 | 49,000 | — | — |
| Roswell Park Memorial Institute | 4 | 533,320 | 3 | 504,070 | 1 | 29,250 | — | — |
| Scientific Associates, Inc. | 1 | 257,652 | 1 | 257,652 | — | — | — | — |
| St. John's University | 1 | 156,392 | 1 | 156,392 | — | — | — | — |
| St. Luke's-Roosevelt Hospital Center | 2 | 312,735 | 1 | 276,672 | — | — | 1 | 36,063 |
| St. Luke's-Roosevelt Institute for Health Sciences | 6 | 723,431 | 6 | 723,431 | — | — | — | — |
| State University of New York, Stony Brook | 14 | 2,205,024 | 13 | 2,185,024 | 1 | 20,000 | — | — |
| State University of New York at Albany | 2 | 242,218 | 2 | 242,218 | — | — | — | — |
| State University of New York at Buffalo | 21 | 4,438,383 | 20 | 4,350,574 | — | — | 1 | 87,809 |
| Syracuse University at Syracuse | 2 | 229,101 | 2 | 229,101 | — | — | — | — |
| University of Rochester | 34 | 9,313,833 | 28 | 8,390,816 | 4 | 589,626 | 2 | 333,391 |
| W. Alton Jones Cell Science Center | 1 | 130,185 | 1 | 130,185 | — | — | — | — |
| Wadsworth Center for Laboratories and Research | 2 | 232,227 | 2 | 232,227 | — | — | — | — |
| Wilson Greatbatch, Ltd. | 1 | 171,810 | 1 | 171,810 | — | — | — | — |
| Yeshiva University | 26 | 8,138,019 | 21 | 7,304,155 | 4 | 607,205 | 1 | 226,659 |
| York College | 0 | 71,164 | 0 | 71,164 | — | — | — | — |
| **Total, New York** | **368** | **88,364,220** | **316** | **79,869,664** | **35** | **3,631,019** | **17** | **4,863,537** |
| **North Carolina** | | | | | | | | |
| Bennett College | 1 | 132,097 | 1 | 132,097 | — | — | — | — |
| Biotherm, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Duke University | 80 | 19,329,290 | 70 | 18,045,333 | 9 | 1,249,531 | 1 | 34,426 |
| East Carolina University | 2 | 135,511 | 1 | 98,570 | — | — | 1 | 36,941 |
| Elcatech, Inc. | 2 | 247,187 | 2 | 247,187 | — | — | — | — |
| Fayetteville State University | 0 | 60,439 | 0 | 60,439 | — | — | — | — |
| North Carolina Agricultural and Technical State University | 2 | 208,062 | 2 | 208,062 | — | — | — | — |
| North Carolina Central University | 0 | 3,780 | — | — | 0 | 3,780 | — | — |
| North Carolina State Department of the Environment/ Health/Nature | 1 | 53,173 | — | — | — | — | 1 | 53,173 |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **North Carolina (continued)** | | | | | | | | |
| North Carolina State University, Raleigh | 4 | 452,659 | 3 | 420,909 | 1 | 31,750 | — | — |
| Pembroke State University | 0 | 7,560 | — | — | 0 | 7,560 | — | — |
| Research Triangle Institute | 1 | 263,781 | — | — | — | — | 1 | 263,781 |
| Triangle Research and Development Corporation | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| University of North Carolina, Chapel Hill | 63 | 17,525,980 | 50 | 12,721,662 | 8 | 635,015 | 5 | 4,169,303 |
| Wake Forest University | 32 | 9,874,179 | 28 | 7,623,257 | 2 | 298,558 | 2 | 1,952,364 |
| **Total, North Carolina** | **190** | **48,393,698** | **159** | **39,657,516** | **20** | **2,226,194** | **11** | **6,509,988** |
| **Ohio** | | | | | | | | |
| Anatrace, Inc. | 2 | 419,881 | 2 | 419,881 | — | — | — | — |
| Case Western Reserve University | 50 | 11,214,756 | 44 | 9,312,003 | 4 | 830,523 | 2 | 1,072,230 |
| CC-Nimbus Cardiac Prosthesis Development Group | 1 | 1,003,382 | — | — | — | — | 1 | 1,003,382 |
| Children's Hospital, Columbus | 1 | 22,276 | — | — | — | — | 1 | 22,276 |
| Children's Hospital Medical Center, Cincinnati | 12 | 2,774,099 | 10 | 2,607,955 | 1 | 146,536 | 1 | 19,608 |
| Cleveland Clinic Foundation | 15 | 5,117,998 | 12 | 3,996,148 | — | — | 3 | 1,121,850 |
| James N. Gamble Institute of Medical Research | 1 | 97,778 | — | — | — | — | 1 | 97,778 |
| Medical College of Ohio at Toledo | 5 | 2,225,367 | 4 | 2,080,344 | 1 | 145,023 | — | — |
| Mount Sinai Medical Center | 5 | 656,592 | 4 | 622,092 | 1 | 34,500 | — | — |
| Northeastern Ohio Universities College of Medicine | 3 | 283,851 | 3 | 283,851 | — | — | — | — |
| Ohio State University | 20 | 3,148,151 | 20 | 3,148,151 | — | — | — | — |
| Ohio University, Athens | 1 | 207,850 | 1 | 207,850 | — | — | — | — |
| Universal Energy Systems, Inc. | 1 | 245,261 | 1 | 245,261 | — | — | — | — |
| University Hospitals of Cleveland | 1 | 191,805 | 1 | 191,805 | — | — | — | — |
| University of Cincinnati | 40 | 8,250,830 | 32 | 6,999,255 | 7 | 805,265 | 1 | 446,310 |
| **Total, Ohio** | **158** | **35,859,877** | **134** | **30,114,596** | **14** | **1,961,847** | **10** | **3,783,434** |
| **Oklahoma** | | | | | | | | |
| College of Osteopathic Medicine, Oklahoma State University | 1 | 100,316 | 1 | 100,316 | — | — | — | — |
| Oklahoma Medical Research Foundation | 10 | 1,362,290 | 9 | 1,356,464 | 1 | 5,826 | — | — |
| University of Oklahoma, Health Sciences Center | 23 | 3,187,778 | 21 | 3,115,058 | 2 | 72,720 | — | — |
| University of Oklahoma, Norman | 1 | 123,928 | 1 | 123,928 | — | — | — | — |
| **Total, Oklahoma** | **35** | **4,774,312** | **32** | **4,695,766** | **3** | **78,546** | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Oregon** | | | | | | | | |
| Bend Research, Inc. | 2 | 90,129 | 2 | 90,129 | — | — | — | — |
| From The Heart Software | 1 | 225,287 | 1 | 225,287 | — | — | — | — |
| Medical Research Foundation of Oregon | 1 | 105,360 | 1 | 105,360 | — | — | — | — |
| Oregon Health Sciences University | 22 | 3,853,693 | 17 | 2,435,131 | 2 | 103,164 | 3 | 1,315,398 |
| Oregon Research Institute | 1 | 317,910 | 1 | 317,910 | — | — | — | — |
| Oregon State University | 1 | 84,715 | 1 | 84,715 | — | — | — | — |
| Providence Medical Center, Portland | 3 | 401,264 | 3 | 401,264 | — | — | — | — |
| University of Oregon | 2 | 271,488 | 2 | 271,488 | — | — | — | — |
| **Total, Oregon** | **33** | **5,349,846** | **28** | **3,931,284** | **2** | **103,164** | **3** | **1,315,398** |
| **Pennsylvania** | | | | | | | | |
| Albert Einstein Medical Center, Philadelphia | 1 | 106,821 | 1 | 106,821 | — | — | — | — |
| Allegheny-Singer Research Institute | 2 | 234,643 | 2 | 234,643 | — | — | — | — |
| Biomol Research Laboratories, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Carnegie-Mellon University | 4 | 702,083 | 3 | 671,583 | 1 | 30,500 | — | — |
| Children's Hospital of Philadelphia | 11 | 2,363,532 | 10 | 2,332,992 | — | — | 1 | 30,540 |
| Children's Hospital of Pittsburgh | 1 | 292,549 | 1 | 292,549 | — | — | — | — |
| Drexel University | 2 | 232,501 | 2 | 232,501 | — | — | — | — |
| Enzymatics, Inc. | 1 | 500,000 | 1 | 500,000 | — | — | — | — |
| Exocell, Inc. | 1 | 48,625 | 1 | 48,625 | — | — | — | — |
| Geisinger Foundation | 1 | 8,134 | 1 | 8,134 | — | — | — | — |
| Geisinger Medical Center | 1 | 96,819 | 1 | 96,819 | — | — | — | — |
| Graduate Hospital, Philadelphia | 7 | 909,023 | 7 | 909,023 | — | — | — | — |
| Hahnemann University | 3 | 764,576 | 1 | 190,859 | — | — | 2 | 573,717 |
| Magee-Women's Hospital | 1 | 66,096 | 1 | 66,096 | — | — | — | — |
| Medical College of Pennsylvania | 12 | 2,779,757 | 10 | 2,566,745 | 2 | 213,012 | — | — |
| Nim, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Pennsylvania State University Hershey Medical Center | 28 | 5,699,243 | 25 | 3,882,161 | 1 | 185,814 | 2 | 1,631,268 |
| Pennsylvania State University, University Park | 9 | 1,829,924 | 9 | 1,829,924 | — | — | — | — |
| Philadelphia College of Pharmacy-Science | 2 | 206,983 | 2 | 206,983 | — | — | — | — |
| Presbyterian Medical Center of Philadelphia | 3 | 284,543 | 3 | 284,543 | — | — | — | — |
| Temple University | 25 | 4,364,079 | 19 | 4,178,329 | 6 | 185,750 | — | — |
| Thomas Jefferson University | 20 | 2,878,308 | 17 | 2,673,767 | 3 | 204,541 | — | — |
| University City Science Center | 5 | 853,147 | 5 | 853,147 | — | — | — | — |
| University of Pennsylvania | 72 | 18,080,516 | 62 | 16,633,531 | 10 | 1,446,985 | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Pennsylvania (continued)** | | | | | | | | |
| University of Pittsburgh at Pittsburgh | 39 | 9,474,761 | 33 | 7,486,637 | 3 | 691,696 | 3 | 1,296,428 |
| Weis Center for Research-Geisinger Clinic | 2 | 268,730 | 2 | 268,730 | — | — | — | — |
| Wistar Institute of Anatomy and Biology | 5 | 847,831 | 5 | 847,831 | — | — | — | — |
| **Total, Pennsylvania** | **260** | **53,993,224** | **226** | **47,502,973** | **26** | **2,958,298** | **8** | **3,531,953** |
| **Rhode Island** | | | | | | | | |
| Brown University | 2 | 307,568 | 1 | 277,068 | 1 | 30,500 | — | — |
| Emma Pendleton Bradley Hospital | 1 | 214,688 | 1 | 214,688 | — | — | — | — |
| Gordon Research Conferences | 1 | 26,833 | 1 | 26,833 | — | — | — | — |
| Memorial Hospital of Rhode Island | 6 | 2,508,293 | 5 | 2,374,963 | 1 | 133,330 | — | — |
| Miriam Hospital | 2 | 529,104 | 2 | 529,104 | — | — | — | — |
| Rhode Island Hospital, Providence | 3 | 793,176 | 1 | 393,296 | — | — | 2 | 399,880 |
| **Total, Rhode Island** | **15** | **4,379,662** | **11** | **3,815,952** | **2** | **163,830** | **2** | **399,880** |
| **South Carolina** | | | | | | | | |
| Benedict College | 0 | 180,470 | 0 | 180,470 | — | — | — | — |
| Claflin College | 1 | 48,626 | 1 | 48,626 | — | — | — | — |
| Clemson University | 2 | 124,337 | 2 | 124,337 | — | — | — | — |
| Medical University of South Carolina | 17 | 2,697,881 | 16 | 2,526,459 | 1 | 171,422 | — | — |
| University of South Carolina at Columbia | 9 | 1,192,236 | 9 | 1,192,236 | — | — | — | — |
| **Total, South Carolina** | **29** | **4,243,550** | **28** | **4,072,128** | **1** | **171,422** | **—** | **—** |
| **South Dakota** | | | | | | | | |
| University of South Dakota | 1 | 79,087 | 1 | 79,087 | — | — | — | — |
| **Total, South Dakota** | **1** | **79,087** | **1** | **79,087** | **—** | **—** | **—** | **—** |
| **Tennessee** | | | | | | | | |
| East Tennessee State University | 2 | 156,398 | 2 | 156,398 | — | — | — | — |
| Meharry Medical College | 11 | 1,291,052 | 11 | 1,291,052 | — | — | — | — |
| Memphis State University | 5 | 806,486 | 5 | 806,486 | — | — | — | — |
| Oak Ridge Associated Universities | 2 | 281,177 | 2 | 281,177 | — | — | — | — |
| Oak Ridge National Laboratory | 1 | 114,697 | 1 | 114,697 | — | — | — | — |
| St. Jude Children's Research Hospital | 6 | 512,173 | 4 | 463,271 | — | — | 2 | 48,902 |
| Tennessee State Department of Health and Environment | 1 | 37,310 | — | — | — | — | 1 | 37,310 |
| Tennessee State University | 0 | 177,443 | 0 | 177,443 | — | — | — | — |
| University of Tennessee, Knoxville | 5 | 643,050 | 5 | 643,050 | — | — | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Tennessee (continued)** | | | | | | | | |
| University of Tennessee, Memphis | 24 | 3,119,679 | 21 | 2,930,570 | 2 | 131,448 | 1 | 57,661 |
| Vanderbilt University | 56 | 12,638,585 | 48 | 11,087,540 | 6 | 1,028,636 | 2 | 522,409 |
| **Total, Tennessee** | **113** | **19,778,050** | **99** | **17,951,684** | **8** | **1,160,084** | **6** | **666,282** |
| **Texas** | | | | | | | | |
| American Heart Association, Dallas | 1 | 39,484 | 1 | 39,484 | — | — | — | — |
| Avox Systems, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| Baylor College of Medicine | 64 | 14,971,903 | 53 | 12,638,931 | 6 | 246,489 | 5 | 2,086,483 |
| Baylor University | 2 | 269,312 | 2 | 269,312 | — | — | — | — |
| Jarvis Christian College | 1 | 74,511 | 1 | 74,511 | — | — | — | — |
| Lifecell Corporation | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| National Institute of Science | 0 | 4,000 | — | — | 0 | 4,000 | — | — |
| Prairie View Agricultural and Mechanical University | 0 | 111,994 | 0 | 111,994 | — | — | — | — |
| Rice University | 4 | 517,730 | 4 | 517,730 | — | — | — | — |
| Southwest Foundation for Biomedical Research | 11 | 5,645,069 | 9 | 3,927,527 | — | — | 2 | 1,717,542 |
| Texas Agricultural and Mechanical University, College Station | 11 | 973,560 | 7 | 864,810 | 4 | 108,750 | — | — |
| Texas College of Osteopathic Medicine | 8 | 658,880 | 7 | 606,840 | 1 | 52,040 | — | — |
| Texas Southern University | 1 | 55,235 | 1 | 55,235 | — | — | — | — |
| Texas Technical University Health Sciences Center | 1 | 87,510 | 1 | 87,510 | — | — | — | — |
| University of Houston, Clear Lake | 1 | 103,971 | 1 | 103,971 | — | — | — | — |
| University of Houston, University Park | 3 | 294,556 | 2 | 161,235 | 1 | 133,321 | — | — |
| University of Texas, Austin | 4 | 278,759 | 3 | 245,759 | 1 | 33,000 | — | — |
| University of Texas, Dallas | 1 | 124,612 | 1 | 124,612 | — | — | — | — |
| University of Texas, San Antonio | 0 | 3,780 | — | — | 0 | 3,780 | — | — |
| University of Texas Health Science Center, Houston | 29 | 6,670,249 | 27 | 4,976,403 | — | — | 2 | 1,693,846 |
| University of Texas Health Science Center, San Antonio | 21 | 5,026,735 | 19 | 4,686,776 | 2 | 339,959 | — | — |
| University of Texas Health Center, Tyler | 7 | 602,480 | 7 | 602,480 | — | — | — | — |
| University of Texas Medical Branch | 13 | 1,214,836 | 11 | 1,157,835 | 2 | 57,001 | — | — |
| University of Texas Southwest Medical Center, Dallas | 38 | 10,352,863 | 33 | 9,461,845 | 4 | 801,050 | 1 | 89,968 |
| University of Texas System Cancer Center | 1 | 192,076 | 1 | 192,076 | — | — | — | — |
| **Total, Texas** | **224** | **48,374,105** | **193** | **41,006,876** | **21** | **1,779,390** | **10** | **5,587,839** |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Utah** | | | | | | | | |
| Brigham Young University | 2 | 62,592 | 2 | 62,592 | — | — | — | — |
| Cardiopulmonics, Inc. | 2 | 100,000 | 2 | 100,000 | — | — | — | — |
| Lazarus Medical, Inc. | 1 | 246,342 | 1 | 246,342 | — | — | — | — |
| LDS Hospital | 2 | 105,767 | 2 | 105,767 | — | — | — | — |
| Medical Physics, Inc. | 2 | 327,759 | 2 | 327,759 | — | — | — | — |
| Rocky Mountain Research, Inc. | 1 | 49,905 | 1 | 49,905 | — | — | — | — |
| Salt Lake Clinic Research Foundation | 1 | 440,872 | — | — | — | — | 1 | 440,872 |
| Technical Research Associates, Inc. | 3 | 350,000 | 3 | 350,000 | — | — | — | — |
| University of Utah | 46 | 10,146,679 | 42 | 8,311,357 | 2 | 322,290 | 2 | 1,513,032 |
| **Total, Utah** | **60** | **11,829,916** | **55** | **9,553,722** | **2** | **322,290** | **3** | **1,953,904** |
| **Vermont** | | | | | | | | |
| Haematologic Technologies, Inc. | 1 | 261,089 | 1 | 261,089 | — | — | — | — |
| University of Vermont and State Agricultural College | 38 | 9,690,819 | 34 | 9,303,676 | 3 | 271,066 | 1 | 116,077 |
| **Total, Vermont** | **39** | **9,951,908** | **35** | **9,564,765** | **3** | **271,066** | **1** | **116,077** |
| **Virginia** | | | | | | | | |
| Chi Associates, Inc. | 1 | 215,242 | 1 | 215,242 | — | — | — | — |
| Eastern Virginia Medical School/ Medical College | 2 | 299,207 | 2 | 299,207 | — | — | — | — |
| Flow Laboratories | 1 | 113,315 | — | — | — | — | 1 | 113,315 |
| Hampton Institute | 0 | 7,658 | — | — | 0 | 7,658 | — | — |
| Molecules For Health, Inc. | 1 | 50,000 | 1 | 50,000 | — | — | — | — |
| National Hospital for Orthopaedics and Rehabilitation | 1 | 104,155 | 1 | 104,155 | — | — | — | — |
| Norfolk State University | 0 | 3,780 | — | — | 0 | 3,780 | — | — |
| University of Virginia, Charlottesville | 39 | 6,017,807 | 34 | 5,455,223 | 5 | 562,584 | — | — |
| Vatell Corporation | 1 | 49,683 | 1 | 49,683 | — | — | — | — |
| Virginia Commonwealth University | 21 | 3,812,743 | 17 | 3,144,584 | 3 | 300,802 | 1 | 367,357 |
| Virginia Polytechnic Institute and State University | 1 | 118,409 | 1 | 118,409 | — | — | — | — |
| Virginia State Department of Health | 1 | 49,050 | — | — | — | — | 1 | 49,050 |
| **Total, Virginia** | **69** | **10,841,049** | **58** | **9,436,503** | **8** | **874,824** | **3** | **529,722** |
| **Washington** | | | | | | | | |
| Barlow Scientific | 2 | 316,278 | 2 | 316,278 | — | — | — | — |
| Biomarine Technologies, Inc. | 1 | 286,000 | 1 | 286,000 | — | — | — | — |
| Eastern Washington University | 1 | 103,040 | 1 | 103,040 | — | — | — | — |
| Fred Hutchinson Cancer Research Center | 9 | 2,167,563 | 8 | 2,134,563 | 1 | 33,000 | — | — |
| Icos Corporation | 1 | 190,007 | 1 | 190,007 | — | — | — | — |
| Pacific Technologies | 1 | 49,935 | 1 | 49,935 | — | — | — | — |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Washington (continued)** | | | | | | | | |
| Puget Sound Blood Center | 6 | 1,645,899 | 5 | 1,605,121 | — | — | 1 | 40,778 |
| Stirling Technology Company | 1 | 1,030,554 | 1 | 1,030,554 | — | — | — | — |
| University of Washington | 76 | 29,832,965 | 65 | 25,757,921 | 8 | 1,584,467 | 3 | 2,490,577 |
| Washington State University | 4 | 354,315 | 4 | 354,315 | — | — | — | — |
| **Total, Washington** | **102** | **35,976,556** | **89** | **31,827,734** | **9** | **1,617,467** | **4** | **2,531,355** |
| **West Virginia** | | | | | | | | |
| Marshall University | 2 | 195,909 | 2 | 195,909 | — | — | — | — |
| West Virginia University | 7 | 973,106 | 7 | 973,106 | — | — | — | — |
| **Total, West Virginia** | **9** | **1,169,015** | **9** | **1,169,015** | — | — | — | — |
| **Wisconsin** | | | | | | | | |
| Blood Center of Southeastern Wisconsin | 8 | 2,784,529 | 8 | 2,784,529 | — | — | — | — |
| Marquette University | 1 | 130,024 | 1 | 130,024 | — | — | — | — |
| Marshfield Medical Research Foundation | 1 | 5,000 | 1 | 5,000 | — | — | — | — |
| Medical College of Wisconsin | 34 | 5,305,547 | 30 | 5,122,065 | 4 | 183,482 | — | — |
| Sinai Samaritan Medical Center, Milwaukee | 2 | 908,269 | 2 | 908,269 | — | — | — | — |
| University of Wisconsin, Madison | 43 | 6,118,618 | 37 | 5,807,314 | 6 | 311,304 | — | — |
| University of Wisconsin, Milwaukee | 2 | 149,353 | 2 | 149,353 | — | — | — | — |
| University of Wisconsin, Parkside | 1 | 93,392 | 1 | 93,392 | — | — | — | — |
| **Total, Wisconsin** | **92** | **15,494,732** | **82** | **14,999,946** | **10** | **494,786** | — | — |
| **Wyoming** | | | | | | | | |
| University of Wyoming | 1 | 124,149 | 1 | 124,149 | — | — | — | — |
| **Total, Wyoming** | **1** | **124,149** | **1** | **124,149** | — | — | — | — |
| **Puerto Rico** | | | | | | | | |
| Ponce School of Medicine | 0 | 65,614 | 0 | 65,614 | — | — | — | — |
| University of Puerto Rico, Medical Sciences | 0 | 25,085 | 0 | 25,085 | — | — | — | — |
| University of Puerto Rico, Rio Piedras | 0 | 70,904 | 0 | 70,904 | — | — | — | — |
| **Total, Puerto Rico** | **0** | **161,603** | **0** | **161,603** | — | — | — | — |
| **Total, United States** | **4,006** | **926,920,735** | **3,410** | **787,572,713** | **390** | **43,865,409** | **206** | **95,482,613** |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Belgium** | | | | | | | | |
| Catholic University of Louvain | 1 | 149,935 | — | — | — | — | 1 | 149,935 |
| **Total, Belgium** | **1** | **149,935** | **—** | **—** | **—** | **—** | **1** | **149,935** |
| **Canada** | | | | | | | | |
| Dalhousie University | 1 | 158,551 | — | — | — | — | 1 | 158,551 |
| Hospital For Sick Children, Toronto | 2 | 198,507 | 2 | 198,507 | — | — | — | — |
| McGill University | 3 | 182,777 | 1 | 125,303 | 2 | 57,474 | — | — |
| McMaster University | 2 | 99,199 | 2 | 99,199 | — | — | — | — |
| Montreal General Hospital | 2 | 176,963 | 2 | 176,963 | — | — | — | — |
| Montreal Heart Institute | 4 | 1,087,333 | 1 | 400,497 | — | — | 3 | 686,836 |
| University of Alberta | 1 | 55,563 | 1 | 55,563 | — | — | — | — |
| University of British Columbia | 1 | 85,817 | 1 | 85,817 | — | — | — | — |
| University of Calgary | 2 | 499,634 | 1 | 49,115 | — | — | 1 | 450,519 |
| University of Manitoba | 1 | 398,774 | — | — | — | — | 1 | 398,774 |
| University of Ottawa | 1 | 383,751 | — | — | — | — | 1 | 383,751 |
| University of Toronto | 1 | 123,819 | 1 | 123,819 | — | — | — | — |
| University of Waterloo | 1 | 409,051 | 1 | 409,051 | — | — | — | — |
| **Total, Canada** | **22** | **3,859,739** | **13** | **1,723,834** | **2** | **57,474** | **7** | **2,078,431** |
| **China** | | | | | | | | |
| Shanghai Children's Hospital | 1 | 84,743 | 1 | 84,743 | — | — | — | — |
| **Total, China** | **1** | **84,743** | **1** | **84,743** | **—** | **—** | **—** | **—** |
| **Germany** | | | | | | | | |
| German Institute for High Blood Pressure Research | 1 | 61,666 | 1 | 61,666 | — | — | — | — |
| **Total, Federal Republic of Germany** | **1** | **61,666** | **1** | **61,666** | **—** | **—** | **—** | **—** |
| **Israel** | | | | | | | | |
| Hadassah University Hospital | 1 | 155,247 | 1 | 155,247 | — | — | — | — |
| Hebrew University of Jerusalem | 1 | 68,413 | 1 | 68,413 | — | — | — | — |
| **Total, Israel** | **2** | **223,660** | **2** | **223,660** | **—** | **—** | **—** | **—** |
| **Italy** | | | | | | | | |
| University of Milan | 1 | 61,636 | 1 | 61,636 | — | — | — | — |
| **Total, Italy** | **1** | **61,636** | **1** | **61,636** | **—** | **—** | **—** | **—** |
| **Netherlands** | | | | | | | | |
| State University of Limburg | 0 | 1,100 | — | — | 0 | 1,100 | — | — |
| **Total, Netherlands** | **0** | **1,100** | **—** | **—** | **0** | **1,100** | **—** | **—** |
| **Spain** | | | | | | | | |
| Children's Hospital, Barcelona | 1 | 63,504 | 1 | 63,504 | — | — | — | — |
| **Total, Spain** | **1** | **63,504** | **1** | **63,504** | **—** | **—** | **—** | **—** |

| Institution | Totals | | Research Grants | | Research Training and Development | | Contracts | |
|---|---|---|---|---|---|---|---|---|
| | No. | Dol. | No. | Dol. | No. | Dol. | No. | Dol. |
| **Sweden** | | | | | | | | |
| Goteborg University | 1 | 441,298 | — | — | — | — | 1 | 441,298 |
| **Total, Sweden** | **1** | **441,298** | — | — | — | — | **1** | **441,298** |
| **Switzerland** | | | | | | | | |
| World Health Organization | 1 | 75,000 | — | — | — | — | 1 | 75,000 |
| **Total, Switzerland** | **1** | **75,000** | — | — | — | — | **1** | **75,000** |
| **Thailand** | | | | | | | | |
| Mahidol University | 2 | 152,924 | 2 | 152,924 | — | — | — | — |
| **Total, Thailand** | **2** | **152,924** | **2** | **152,924** | — | — | — | — |
| **United Kingdom** | | | | | | | | |
| Charing Cross Hospital | 1 | 20,700 | — | — | 1 | 20,700 | — | — |
| Medical Research Council | 1 | 25,200 | — | — | 1 | 25,200 | — | — |
| Medical Research Council | 1 | 81,505 | 1 | 81,505 | — | — | — | — |
| University of London | 4 | 294,279 | 3 | 281,043 | 1 | 13,236 | — | — |
| Wellcome Research Laboratories | 1 | 21,176 | — | — | 1 | 21,176 | — | — |
| **Total, United Kingdom** | **8** | **442,860** | **4** | **362,548** | **4** | **80,312** | — | — |
| **Venezuela** | | | | | | | | |
| Association for Investigative Dermatology | 1 | 13,592 | 1 | 13,592 | — | — | — | — |
| **Total, Venezuela** | **1** | **13,592** | **1** | **13,592** | — | — | — | — |
| **Total, Foreign Countries** | **42** | **5,631,657** | **26** | **2,748,107** | **6** | **138,886** | **10** | **2,744,664** |
| **Grand Total†** | **4,042** | **931,321,884** | **3,426** | **788,944,631** | **398** | **43,999,976** | **218** | **98,377,277** |

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*Contract figures include contract awards in support of the Division of Intramural Research and the Office of the Director, NHLBI, as well as interagency and intra-agency agreements.

†Number of awards may not agree with other tables because of the method of counting supplements. Dollar amounts exclude Research Facilities Construction Grants.

# Appendix

# Types of Research Activity

## Research Projects

**Research Project Grants (R01):** To support discrete and specific projects to be performed by one or several investigators in areas of the investigators' particular interests and competencies.

**Research Projects (Cooperative Agreements) (U01):** To support discrete, circumscribed projects in areas of an investigator's specific interest and competency involving substantial programmatic participation by the NHLBI during performance of the activity.

**Research Program Projects (P01):** To support broadly based, multidisciplinary, often long-term research projects that have specific major objectives or basic themes. A program project addresses a range of problems and has a central research focus in contrast to the narrower focus of a research project grant (R01). A program project is a system of activities directed toward a well-defined research program goal. Usually, a relatively large organized group of researchers conducts individual subprojects, the results of which help achieve objectives of the program project.

**First Independent Research Support and Transition (FIRST) Award (R29):** To provide a sufficient initial period of research support for newly independent biomedical investigators to develop their research capabilities and demonstrate the merit of their research ideas.

**Method to Extend Research in Time (MERIT) Award (R37):** To provide long-term research grant support to investigators whose research competence and productivity are distinctly superior and who are likely to continue to perform in an outstanding manner. Investigators may not apply for a MERIT award; instead, they are selected by the NHLBI based on their current grant applications and their present and past grant support.

**Small Business Innovation Research (SBIR) Grants, Phase I (R43):** To support projects, limited in time and amount, to establish the technical merit and feasibility of research and development ideas that may ultimately lead to commercial products or services.

**Small Business Innovation Research (SBIR) Grants, Phase II (R44):** Research project support for ideas that have been shown to be feasible in Phase I and that are likely to result in commercially marketable products or services.

## Research Centers

**Specialized Centers of Research (SCOR) Grants (P50):** To support both basic and clinical research related to an Institute-identified theme. The spectrum of SCOR activities comprises multidisciplinary approaches to specific disease entities or biomedical problem areas. SCOR grants differ from research program projects in that they are in response to an announcement of programmatic needs of the Institute. Centers may be asked to perform additional studies because of urgently needed information or may serve as a regional or national resource for special purpose research.

**Comprehensive Centers Grants (P60):** To support basic and clinical research and other research activities related to community needs, such as demonstration and education research. Such a center can be based in a university or other institution involved with research, and it can also involve other local resources. It is designed to foster biomedical research at fundamental and clinical levels; to initiate and expand community education and screening and counseling programs; and to educate health professionals concerning problems of diagnosis and treatment of specific diseases, such as sickle cell anemia.

## Research Career Programs

**Research Career Development Award, RCDA (K04):** To foster the development of young scientists with outstanding research potential for careers of independent research in the sciences related to heart, lung, and blood diseases and blood resources.

**Research Career Awards, RCA (K06):** To assist institutions in supporting established investigators of high competency for the duration of their careers. New grants are no longer awarded.

**Academic Awards (K07):** To create and encourage a stimulating approach to disease curricula that will attract quality students; foster academic career development of teacher-investigators; develop and implement multidisciplinary curricula; and strengthen existing programs. This award series includes the Preventive Cardiology Academic Award (PCAA), the Preventive Pulmonary Academic Award (PPAA), the Transfusion Medicine Academic Award (TMAA), the Pulmonary Academic Award (PAA), and the Academic Awards in Systemic and Pulmonary Vascular Diseases. New grants are no longer awarded in the Pulmonary Academic Program.

**Clinical Investigator Awards, CIA (K08):** To provide an opportunity for clinically trained physicians with demonstrated potential to develop into independent investigators and to aid in filling faculty gaps in areas of shortage in health profession institutions.

**Physician Scientist Awards (K11):** To encourage newly trained clinicians to develop independent research skills and experience in one of the fundamental sciences.

**Minority School Faculty Development Awards (K14):** To develop faculty investigators at minority schools and enhance their research capabilities in health and health-related areas.

## Other Research Grants

**Cooperative Clinical Research (R10):** To support studies and evaluations of relevant clinical problems. These grants usually involve collaborative efforts among several institutions and principal investigators and are conducted under a formal protocol.

**Minority Biomedical Research Support (MBRS) Grants (S06):** To strengthen the biomedical research and research training capability of minority institutions and to assist in increasing the involvement of minority faculty and students in biomedical research.

**Small Instrumentation Grants (S15):** To support the purchase of equipment costing between $5,000 and $60,000 to be used by one or more recipients of NHLBI research grants in their NHLBI-supported projects.

**Research Demonstration and Education Projects (R18):** To provide support designed to develop, test, and evaluate health-related activities and to foster the application of existing knowledge to the control of heart, lung, and blood diseases.

**Small Grants (R03):** To provide limited support for extended analyses of research data generated by clinical trials, population research, and demonstration and education studies.

**Scientific Evaluation:** To support a Program Project Review Committee (P09), an initial Scientific Review Group (R09, U09), or a training committee (T09) responsible for the assessment of scientific and technical merit of grant applications.

**Education Projects (R25):** To develop and/or carry out a program as it relates to a categorical area in one or more of the areas of education, information, training, technical assistance, coordination, or evaluation.

**Conference Grants (R13):** To support national and international scientific meetings, conferences, or workshops at which research is discussed.

**Professional Continuing Education (Development) Training (T15):** To assist professional schools and other public and nonprofit institutions to establish, expand, or improve programs of continuing professional education and especially programs dealing with new scientific developments.

## Individual National Research Service Awards (NRSA)

**Postdoctoral Individual NRSA (F32):** To provide postdoctoral research fellowship training to individuals to broaden their scientific background and extend their potential for research in specific health-related areas.

**NRSA for Senior Fellows (F33):** To provide experienced scientists with an opportunity to make major changes in the direction of their research careers; to broaden their scientific background; to acquire new research capabilities; to enlarge their command of an allied research field; or to take time from regular professional responsibilities for the purpose of broadening research capabilities.

**Minority Access to Research Careers (MARC) Faculty Fellowships (F34):** To provide fellowships to faculty members from minority institutions to enable them to obtain advanced training in specific health and health-related areas.

**Intramural NRSA Individual Postdoctoral Program Appointee (F35):** To offer research health scientists, research clinicians, and others the opportunity to receive full-time research training in the intramural laboratories of the NHLBI and of other Institutes of the NIH.

## Institutional National Research Service Awards (NRSA)

**Institutional NRSA (T32):** To enable institutions to make awards to individuals selected by them for predoctoral and postdoctoral research training in specific health-related areas.

**Minority Institutional Research Training Program (T32M):** To support full-time research training for investigative careers at minority schools in areas of cardiovascular, pulmonary, or hematologic diseases. Graduate students, postdoctoral students, or health professions students may be supported under this program.

**Short-Term Research Training (T35 and T35S):** To provide individuals with research training during off-quarters or summer periods to encourage research careers or to encourage research in areas of national need. This program includes the Short-Term Training for Minority Students Program and short-term training for students in health professional schools.

**MARC Visiting Professors for Minority Institutions (T36):** To increase the number of well-trained minority scientists in biomedical disciplines and to strengthen the research and teaching capabilities of minority institutions.

## Other Support

**Research and Development Contracts (N01):** To develop or apply new knowledge or test, screen, or evaluate a product, material, device, or component for use by the scientific community.

**NIH Interagency Agreements (Y01):** To provide a source of funds to another Federal agency to acquire specific products, services, or studies.

**NIH Intraagency Agreements (Y02):** To provide a source of funds to another NIH component to acquire specific products, services, or studies.

**Research Supplements for Underrepresented Minorities:** To provide supplemental funds to active NHLBI grants to support the research of minority high school, undergraduate, and graduate students; postdoctoral trainees; and investigators.

# List of Abbreviations

| | |
|---|---|
| AIDS | Acquired Immunodeficiency Syndrome |
| ARIC | Atherosclerosis Risk in Communities |
| BARI | Bypass Angiography Revascularization Investigation |
| CABG | Coronary Artery Bypass Graft |
| CARDIA | Coronary Artery Risk Development in Young Adults |
| CASS | Coronary Artery Surgical Study |
| CAST | Cardiac Arrhythmia Suppression Trial |
| CATCH | Child and Adolescent Trial for Cardiovascular Health |
| CEC | Council of European Communities |
| CHD | Coronary Heart Disease |
| CIA | Clinical Investigator Award |
| COE | Council of Europe |
| COPD | Chronic Obstructive Pulmonary Disease |
| CPR | Cardiopulmonary Resuscitation |
| CVD | Cardiovascular Diseases |
| DBDR | Division of Blood Diseases and Resources |
| DEA | Division of Extramural Affairs |
| DECA | Division of Epidemiology and Clinical Applications |
| DHVD | Division of Heart and Vascular Diseases |
| DIG | Digitalis Trial |
| DIR | Division of Intramural Research |
| DISC | Dietary Intervention Study in Children |
| DLD | Division of Lung Diseases |
| FE | Federal Building |
| FIRST | First Independent Research Support and Transition |
| FRG | Federal Republic of Germany |
| FTE | Full-Time Equivalent |
| FTTP | Full-Time Training Position |
| FY | Fiscal Year |
| HEW | Department of Health, Education, and Welfare (now HHS) |
| HCFA | Health Care Financing Administration |
| HIFI | High Frequency Intervention |
| HIV | Human Immunodeficiency Virus |
| HHS | Department of Health and Human Services (formerly HEW) |
| HSA | Health Services Administration |
| IAA | Intra-Agency Agreement or Inter-Agency Agreement |
| ICD | International Classification of Diseases (WHO) |
| LRC | Lipid Research Clinics |
| MARC | Minority Access to Research Careers |
| MBRS | Minority Biomedical Research Support |
| MERIT | Method to Extend Research in Time |
| MIRS | Minority Investigator Research Supplement |
| MGRS | Minority Graduate Research Supplement |
| MONICA | Multinational Trends and Determinants in Cardiovascular Disease |
| MRFIT | Multiple Risk Factor Intervention Trial (Extension) |
| MURS | Minority Undergraduate Research Supplement |
| NAEP | National Asthma Education Program |
| NBREP | National Blood Resource Education Program |
| NCEP | National Cholesterol Education Program |
| NCHS | National Center for Health Statistics |
| NGHS | NHLBI Growth and Health Study |
| NHANES | National Health and Nutrition Examination Survey |
| NHBPEP | National High Blood Pressure Education Program |
| NHLBAC | National Heart, Lung, and Blood Advisory Council |
| NHLBI | National Heart, Lung, and Blood Institute (formerly NHI and NHLI) |
| NIH | National Institutes of Health |
| NRSA | National Research Service Award |

| | |
|---|---|
| OAM | Office of Administrative Management |
| OD | Office of the Director |
| OIP | Office of International Programs |
| OPEC | Office of Prevention, Education, and Control |
| OPPE | Office of Program Planning and Evaluation |
| PAA | Pulmonary Academic Award |
| PCAA | Preventive Cardiology Academic Award |
| PEPI | Postmenopausal Estrogen/Progestin Interventions |
| PFDA | Pulmonary Faculty Development Award |
| PHS | Public Health Service |
| PIOPED | Prospective Investigation of Pulmonary Embolism Diagnosis |
| PRC | People's Republic of China |
| PROPS II | Penicillin Prophylaxis in Sickle Cell Disease |
| PSA | Physician Scientist Award |
| PTCA | Percutaneous Transluminal Coronary Angioplasty |
| RCA | Research Career Award |
| RCDA | Research Career Development Award |
| R & D | Research and Development |
| RDS | Respiratory Distress Syndrome |
| RFA | Request for Applications |
| RFP | Request for Proposals |
| RMS | Research Management and Support |
| SBIR | Small Business Innovation Research |
| SCOR | Specialized Center(s) of Research |
| SC-V | Simultaneous Compression and Ventilation |
| SEP | Smoking Education Program |
| SHEP | Systolic Hypertension in the Elderly Program |
| SOLVD | Studies of Left Ventricular Dysfunction |
| TIMI | Thrombolysis in Myocardial Infarction |
| TMAA | Transfusion Medicine Academic Award |
| TOHP | Trials of Hypertension Prevention |
| USSR | Union of Soviet Socialist Republics |
| WHL | World Hypertension League |
| WHO | World Health Organization |
| WW | Westwood Building |

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